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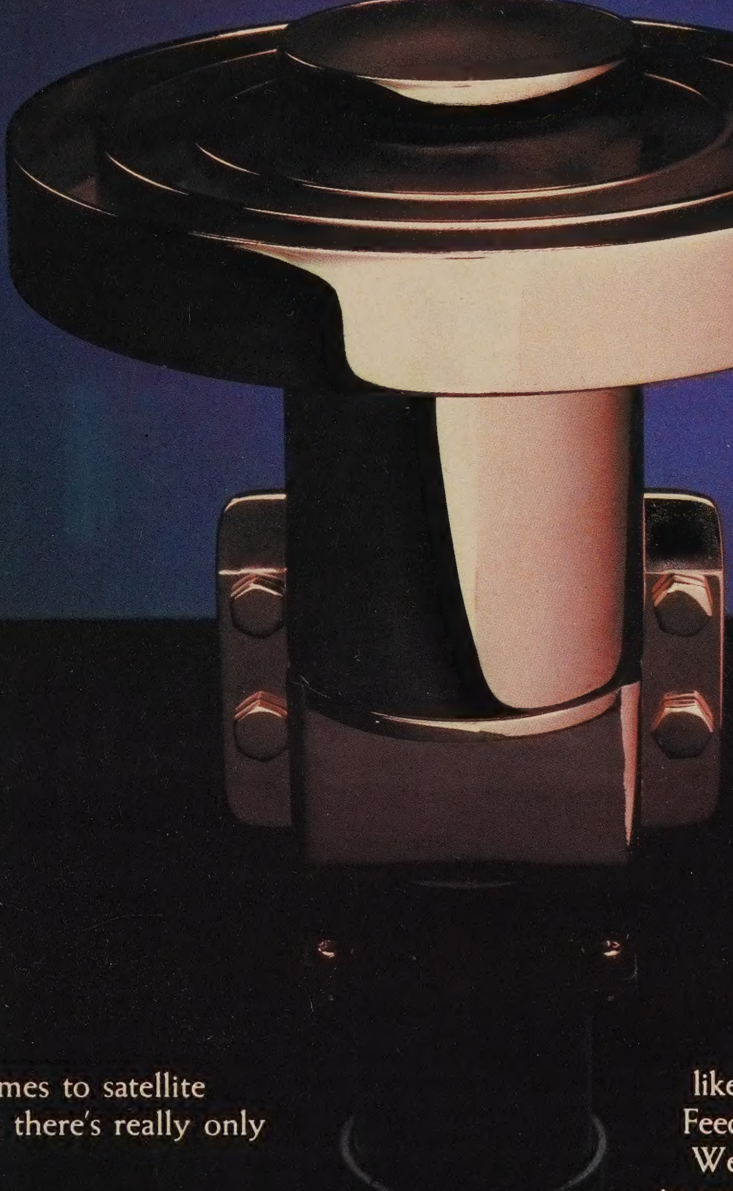

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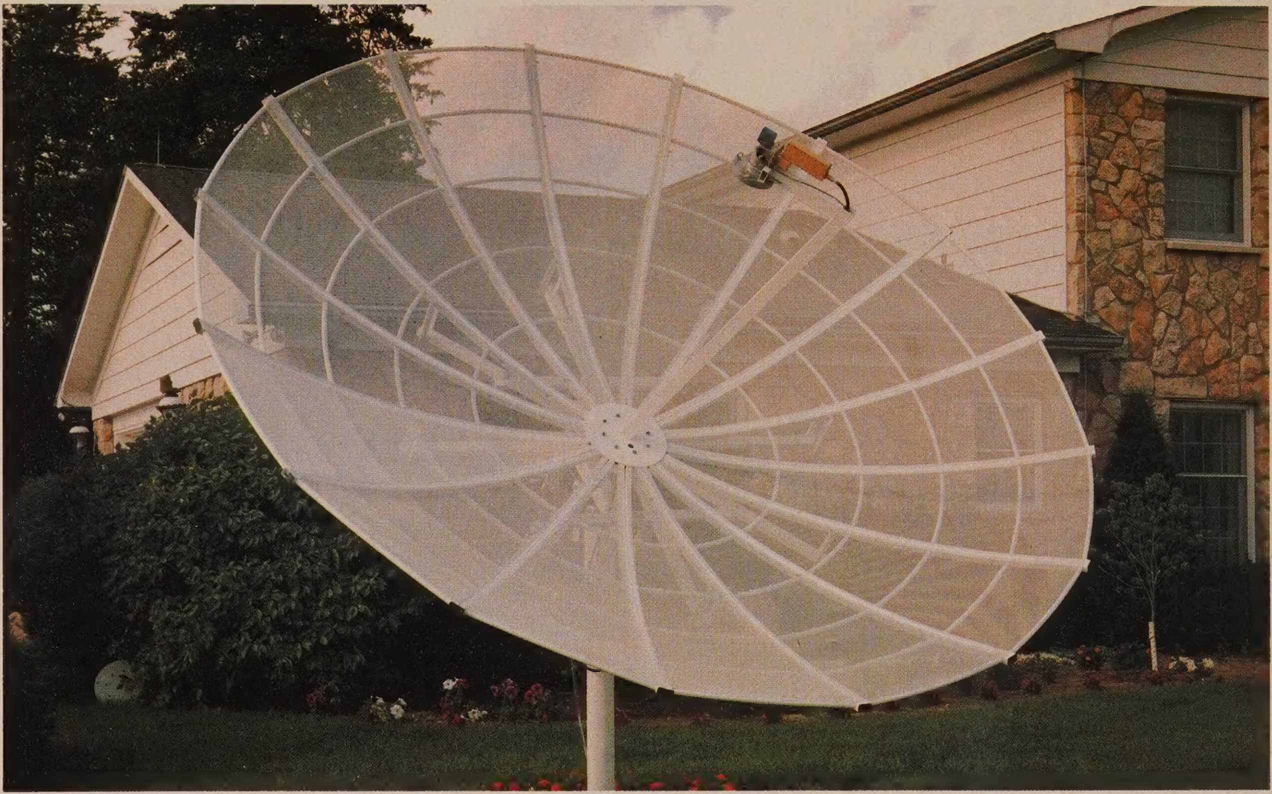

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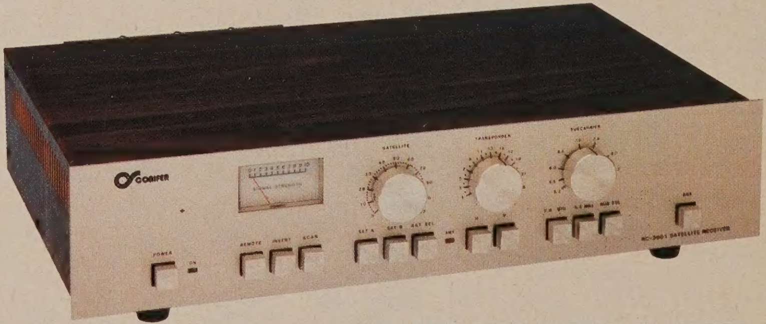

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OCTOBER 1983 VOLUME I, NUMBER 10

Satellite TV Magazine

The Number One TVRO Magazine

FEATURE ARTICLES

RARC REPORT/*Stan Prentiss* 24
DIRECT BROADCAST SATELLITES
Interesting Times Ahead/*Andrew F. Inglis* 32
SATCOM IR PROFILE/*RCA AMERICOM* 37
ALASKA SATELLITE NETWORK/*Tim Olin* 40
SOLAR SAIL RACE TO THE MOON/*Jeffrey Manber* 44
SATELLITE TECHNOLOGY AIDS CHINESE NEWSPAPER 92

TECHNICAL ARTICLES

IS 2° REALLY 2°?/*Charles Schreiner and Martin Manley* 22
NEW FEEDS FOR DEEP DISHES/*Mike Gustafson* 64
BACK TO BASICS
The Power Supply Part II/*Gary Wheelus* 78
FORD'S CONTINENTAL CONCEPT 100
Bringing Satellites to Detroit/*Stan Prentiss* 82

PRODUCT REVIEW

THE AVCOM COM 2A/2B RECEIVERS/*Staff Report* 70

DEPARTMENTS

EDITOR'S CORNER/*Chris Schultheiss* 8
LISTENING IN/*David Day* 10
AND NOW A FEW WORDS ABOUT ...
editorial comment by Mike Gustafson 13
TERRESTRIAL LINKS 17
THE CANADIAN SCENE/*Bill Barr* 18
NEWS 29
PROGRAMMING GUIDE 49
NEW PRODUCT HIGHLIGHTS 86
UPLINK - DOWNLINK (Letters To The Editor) 96
NORTH AMERICAN TVRO DEALER LISTINGS 110
ADVERTISERS' INDEX 113

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Subscription Rates: Annual 12 issue rate for the U.S. is $24.95 including postage and handling. $29.95 in Canada and Mexico. $65.00 Elsewhere (U.S. Funds Please)

About Our Cover: Photo of the new JENSEN antenna by Bill Pace, compliments to Jean Beaty of JENSEN. This is a deep (F/D .3) 12′ mesh antenna recently introduced by this Racine, Wisconsin firm. For more information on this antenna turn to page 9.

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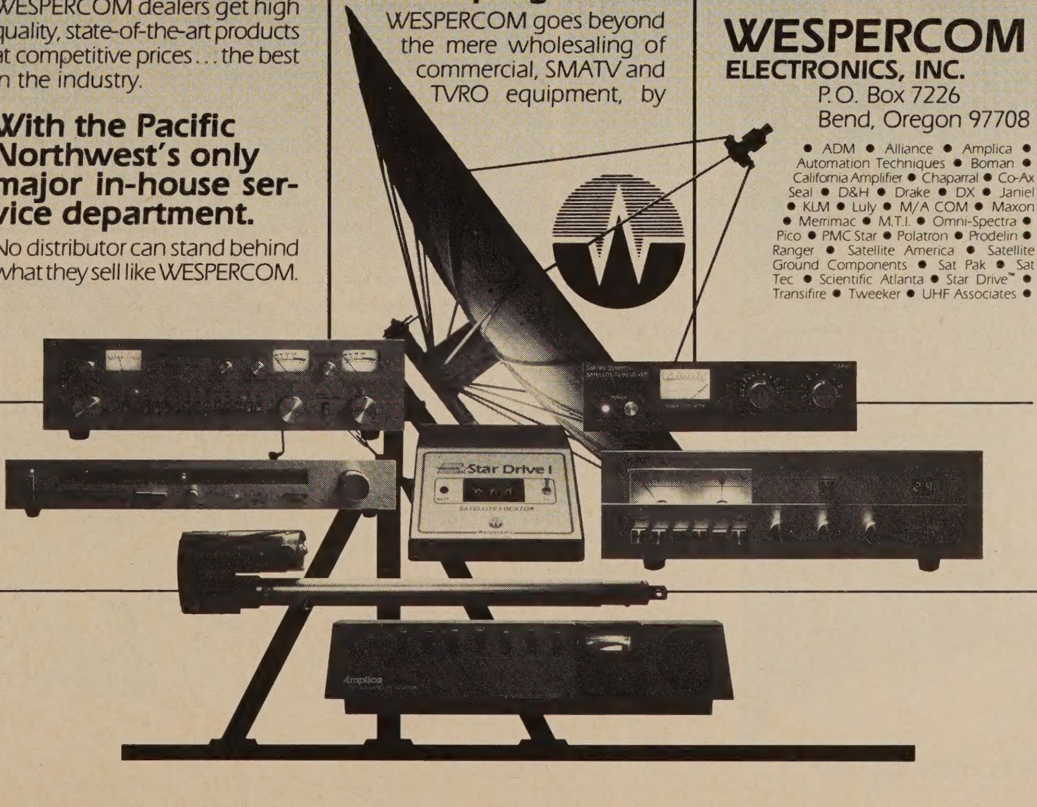

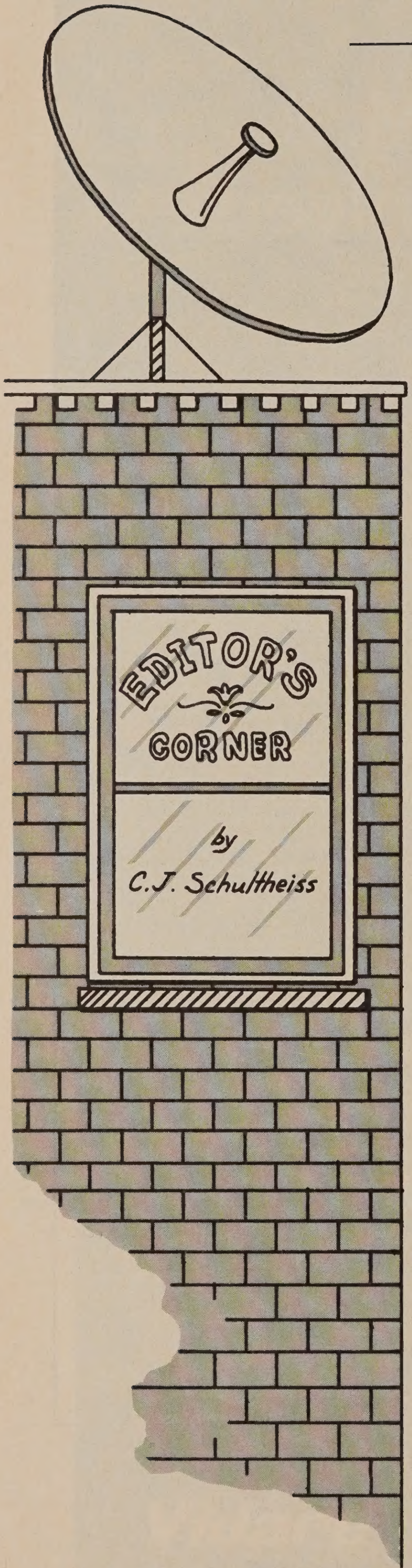

Editor's Corner

By C.J. Schultheiss

One of the hottest and most controversial subjects that has been addressed between the covers of this magazine is the scrambling issue. We have tried to deal with this subject in an objective and straightforward manner, but apparently we have failed.

An avalanche of mail has been received from manufacturers, dealers, consumers and programmers. Even the local dogcatcher has gotten into the act. (I'll save that story for another time.)

Our editorial position is simple and straightforward - yes, some channels will be scrambled in addition to ON-TV, CAN-COM, and Blue Max - **however many, many more will not be scrambled!** The programmers that do eventually scramble will inevitably make descramblers available to private terminal owners simply because they cannot ignore the potential revenue from hundreds of thousands of new customers. There are a myriad of problems to be solved, such as standardization and interchangeability of descramblers, distribution and marketing of both the hardware and the software, and overcoming the pressure of the cable companies who think they and they alone have a divine right to the distribution of programming.

STV Magazine does not specifically wish to appear as an advocate of black market descramblers. However, if programmers do not address the private terminal market in the near future, there is no doubt that the sale of non-authorized descramblers will proliferate. Oak Orion and Blue Max have taken a step in the right direction by offering to sell the Oak Orion Descrambler and an annual subscription to private terminal owners. Unfortunately at $1800.00 for the descrambler and $350.00 for an annual subscription, it is probably not going to set the world on fire.

Several dealers have complained vociferously that the scrambling editorials in this magazine have "scared off" a few potential customers -I am sorry if this is the case - but at no time did we sensationalize or over-dramatize the issue. In all good conscience the subject of scrambling must be addressed and we will attempt to keep you up to date as new developments occur.

In the past six weeks, I have taken the time to get out and visit many different areas of the country to tour many of the major manufacturers and distributors in the industry. My travels have taken me to the West Coast where we visited Chaparral, Dexcel, Avantek, KLM, Amplica, Janeil and California Amplifier. Further east, I was able to spend some time visiting M/A-Com's numerous facilities stretching from North Carolina to Fort Wayne, Indiana, including Burlington, Massachusetts, and Toronto, Canada. I came away most impressed with the commitment and investment that each of these companies have made to this industry. In between these visits, I combined a little business and pleasure, and drove from North Carolina up the East Coast through Virginia, West Virginia, Maryland, Pennsylvania, New York, Ontario, Quebec, New Brunswick, Nova Scotia and Prince Edward Island. I apologize if this sounds like a travelogue, but I wish to point out the diversity of the places I visited. The total round trip was in excess of 4,000 miles and I was excited whenever I came across a TVRO system, but then it occurred to me how many homes in obviously underserved rural areas (I was lucky to find one FM radio station on the car radio) have yet to be sold on the value of a satellite terminal.

It brought to mind a little anecdote told by Thomas Bata, of Bata Shoes, who has manufacturing plants all over the world. Bata once sent two representatives to a middle eastern country (mostly desert) to study the feasability of building a shoe factory. One representative telegrammed Bata with a cryptic message - "Forget shoe factory - nobody wears shoes in this country" while the second representative sent an equally cryptic message - "Great place for a shoe factory -nobody has shoes in this country".

Until next time,

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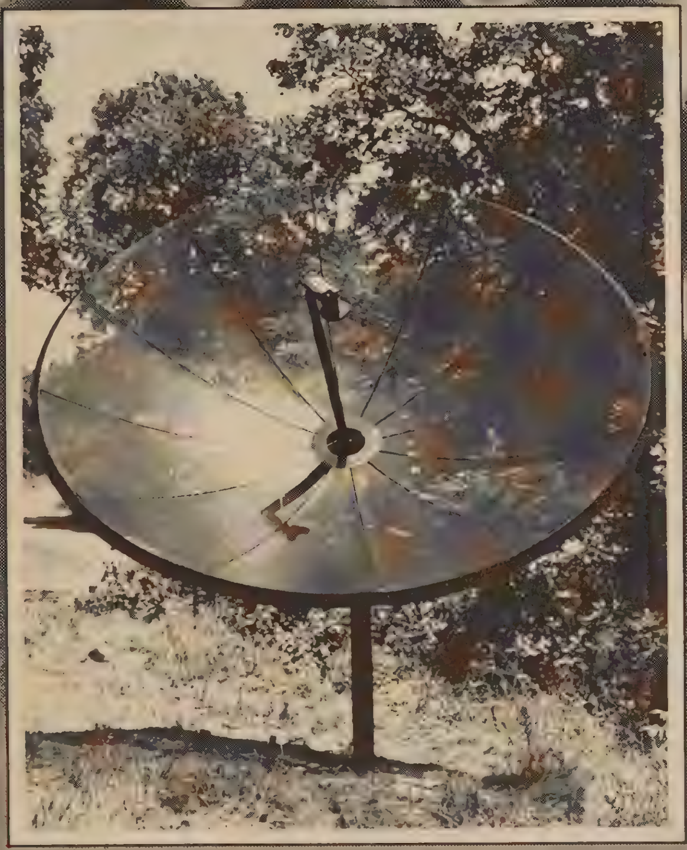

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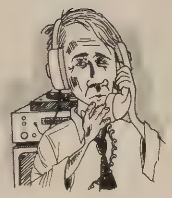

Listening In

By David Day

“The Tale of The Tape” ....

The summer months are not the best time to monitor television programming with repeats of re-runs and old Reagan movies. But the HBO coverage of Wimbledon was well up to standard with the might of NBC taking over from the semi-finals onwards on COMSTAR D 3, Transponder 1 - No **not** Transponder 24 “Channel Guide”! While tuned to NBC following Wimbledon coverage, it occured to me that network television was much better by Satellite than I had remembered, but the promise of one of those superb NBC Tour Jackets with the embroidered peacock by Guy E. Davis Sr. of The House Of Aztec, Huntington Beach, does help somewhat. He is one of the gentlemen of our industry and many of you will know his son also, Guy C. Davis, V.P. Sales of INTERSAT and a welcome regular speaker at seminars.

Wisely foresaking the TV screen until Fall, but still in keeping with the title of this column ‘Listening In’: the industry seminars have provided some very rewarding listening. It is rightfully claimed here, that you the reader shall be told it “like it is”. You deserve the factual truth and writers should recognize this serious responsibility they owe to their readers. Our’s is much the same responsibility as that of the Disciples recording early biblical history, as we chronicle the pioneer days of our youthful TVRO industry.

This writer was most concerned to hear Dr. Taylor Howard say at CAN/AM recently, “There is an article I have read - it was a transcription of a talk I did at Boulder or Denver. It is the worst single thing I have ever read. I didn’t know I talked like that”.

Dr. Taylor Howard’s reputation as one of our leading authorities and speakers is without question. That article he referred to appeared in “Channel Guide” June 26-July 2, 1983, Volume 3, Number 22. Although space does not allow a full comparison, here are some of the major differences between what Dr. Howard said and what “Channel Guide” reported so wrongly .....

This is what “Channel Guide” reported:	&	**This is what Dr. Taylor Howard really said:**
“It’s a little confusing because it has 12 and 14 GHz **next**”	=	“It’s a little confusing because it has 12 and 14 GHz **mixed**”

(Dr. Howard’s reference to the Seminar book published by “Channel Guide” themselves - yet another example of confused thinking on their part but read on, for the next quote is an all time classic.)

“Therefore the higher the carriage - the ratio the better picture you get over some weather”	=	“Therefore the higher the carrier to noise ratio the better picture you get over some limit”
“..... signal the noise ratio” (Early Roman command?)	=	“..... signal to noise ratio”
“..... it isn’t just driven by the carriage of noise ratio .... between the uplink in the Satellites ..... with casgrain feeds ..... lower rated low noise amplifiers”. (Followed by more schoolboy howlers line after line!)	=	“..... it isn’t just driven by the carrier to noise ratio .... between the uplink and the Satellites ..... with Cassegrain Feeds ..... before we had Low Noise Amplifiers”.

Research reference sources:-
“Channel Guide” June 26-July 2, 1983.
“Fundamentals of Private Cable” 1983 Sat Expo Co. Page 24
Dr. Taylor Howard talks at both Denver Sat-Expo ’83 and S.T.T.I. CAN/AM ’83 Minneapolis recorded by “Conference Cassettes”.

Continued on page 109

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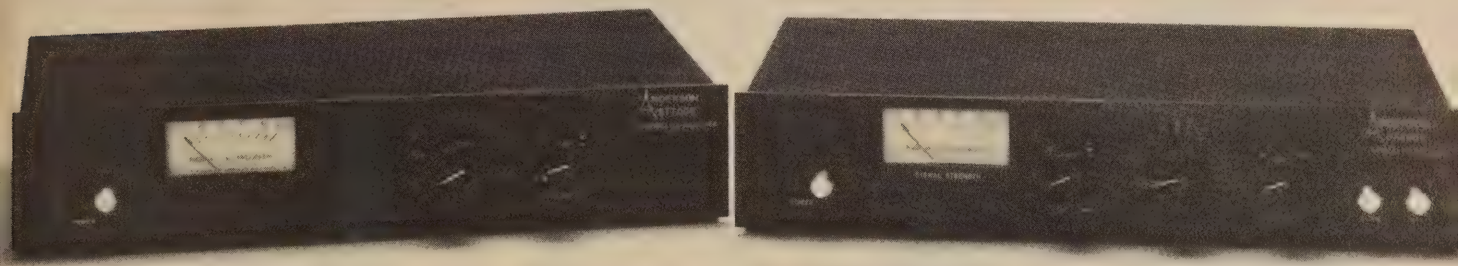

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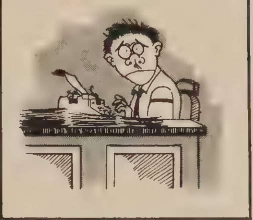


And Now, A Few Words About ...

By Mike Gustafson

RCA Communications seems to be having more than their share of problems. As you may remember, RCA lost a rather major satellite called F-3 a few years back. That's why the next RCA satellite was called F-3r, "r" for replacement. Then during the month of April of this year, they lost all the horizontal transponders on Satcom F-2. They have put in a 20 million dollar insurance claim for that loss. How would you like to see their insurance premium next year?

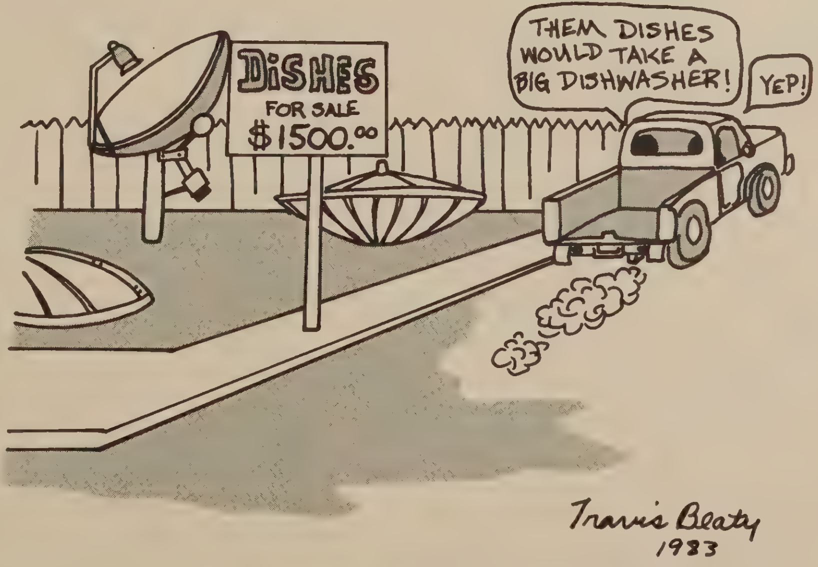
RCA's troubles are still not over. On July 6 of this year, their brand new bird Satcom F-1r went into a roll mode during normal station keeping maneuvers. What this really means is they lost control of the bird for some period of time. The satellite was loaded up with data and phone traffic at the time of attitude control failure. This traffic was switched over to other satellites for awhile until RCA figured out what was up with their new satellite. The satellite was turned off and allowed to cool down before testing was started to try to find the problem. About a week later I noticed that it was turned back on, so they must have figured out what the problem was.

If RCA were to lose this new bird, they could have a tough time finding anyone to buy space on their new satellites. Hughes Communications already supplies 70% of the world's communications satellites, and with all these failures, RCA might find themselves with a lot of empty transponders as users move over to Westar or Galaxy.

Speaking of Galaxy, as you read this, Galaxy (G-1) should be full of video and putting in a strong signal all over the country. Based on reports I have been getting, G-1 transponder's output power is the highest of any U.S. domestic C-band satellite yet launched. RCA (Satcom) transponders use 5.0 watts or 8.5 watts, Westar uses 7.5 watts, and Galaxy runs 9.0 watts. As I write this piece in July, I am seeing test signals on G-1 in its final orbit position at 134 degrees West. Judging by the amount of power I see, you should be able to see the signals without an antenna! Just hold your LNA out the window and there it will be. For you brave souls out there, you can probably get usable pictures off a 4 foot dish on G-1. Stand by for more hype about the new receiver technology "break throughs" by using a 4 foot dish. Like P.T. Barnum said, "There's a sucker born every minute". Don't you be one of them!

After January 2 of 1984, it will get harder and harder to watch some of the network programming on your satellite system. This is because N.B.C. has entered into a hundred million dollar contract with Comsat General, a division of Comsat, to start installing Ku-band uplinks and downlinks for all of N.B.C.'s affiliates. At first there will be two main uplinks, one in New York and the other in beautiful downtown Burbank. There will also be three transportable up/downlinks to be used by N.B.C. for sporting events. There go the football games without commercials! This contract will be for ten years and will start with just 24 affiliate stations. This gives N.B.C. the honor of being the first network to distribute programming via Ku-band satellites. After they have worked out all the problems, and there are lots of them, the other networks will be looking hard at this new distribution system. Don't run out and slap a For Sale sign on your system just yet, they will be simulcasting on both bands for many years to come.

★ ★ ★



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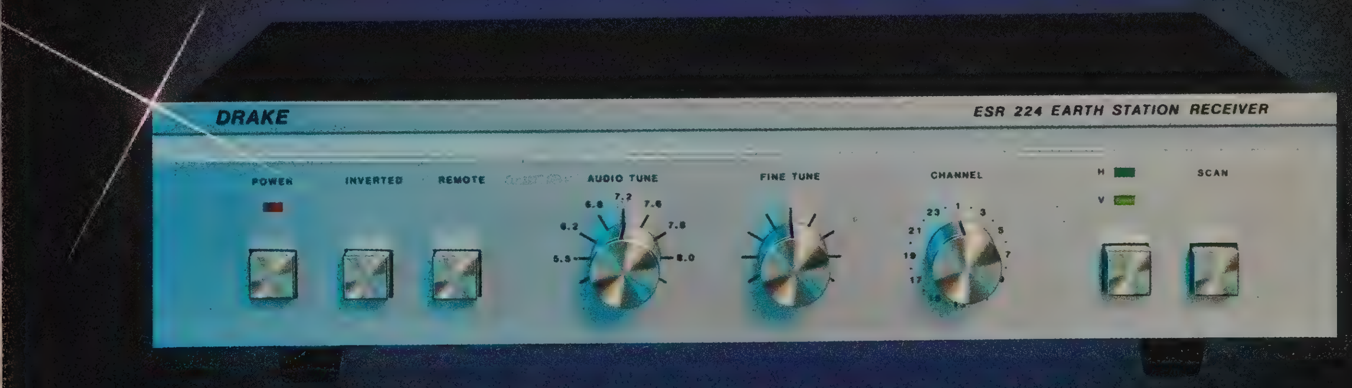
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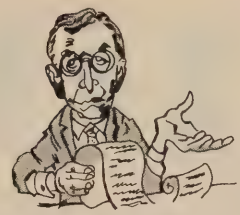

ISLAND PUBLISHER MARKETING TVRO's It is rumored that a TVRO dealership has opened up in the islands. A rather unique marketing theme has apparently been adopted. TVRO equipment is solicited from manufacturers and distributors at no cost - ostensibly for testing and evaluation in a small well known trade publication - then the guru publisher does some sleight-of-hand and becomes a TVRO dealer selling the systems to local residents. The profit margin is excellent but the ethics dubious. Several companies who have participated in this "surprise give-away" have expressed thier displeasure and do not plan to contribute further to his high profit scheme!

FEED AMALGAMATION - You can expect to see a solid state "Polarotor™" from Chaparral in the near future. Reportedly, our friend from the LA area who is credited with the first consumer ferrite polarization device has signed an agreement with the number 1 feed manufacturer.

NASDA DEFUNCT - Lack of support and a conflict of interest has forced the "dealer association" to shut down operations after a few short months of operation. The ex-members are probably wondering if their membership fees will be refunded.

SAN JOSE SATEXPO CANCELLED - The plans for a fall show have been cancelled. Andy Gibbs announced that Channel Guides decision not to participate forced the cancellation. Mr. Gibbs was apparently not pleased with the last minute withdrawal by Channel Guide.

GALVIN/ISV DIVORCE - Rich Galvin and International Satellite Video have parted company. Rich has been seen running back and forth to Las Vegas with his briefcase and he is either frequenting the blackjack tables or consulting with a Vegas TVRO company.

CANADIAN MTV - Rumors of a Canadian Music Channel have hit the street. It is reported that eight companies are vying for CRTC approval.

PUBLIC LNA's - There is a rumor that a privately held West Coast LNA manufacturer may be planning to go public. The company has been doing very well and has managed to grab a good marketshare which should make an attractive offering to investors.

TRANSTAR EXPANDS - Tommy Tow and Transtar Communication of Franklin Tennessee have moved into new facilities. The 10,000 square foot facility is located at 1108 Harpath Industrial Court in Franklin.

NEWTON LOSES STOVER - John Stover formerly with Newton Electronics has left the California electronics firm to start his own marketing consultant company to be called Hi-Q Marketing. Stover will also publish a marketing newsletter to be introduced this fall.

SPACE AGE TIMES - This bimonthly publication is the "voice" of the United States Space Education Association which is a non profit organization dedicated to providing information and news about space exploration to its members. Annual membership is very reasonable and a must for space buffs. Contact USSEA at 746 Turnpike Rd., Elizabethtown, PA 17022. Telephone (717) 367-3265.

The Canadian Scene

By Bill Barr

The Canadian Football League got up to some funny business last week on Thursday July 15th. A home game with the Toronto Argonauts was subject to local blackout rules, which up until now would mean the local taverns would be full due to the network feed being on Anik B satellite.

Lots of satellite sales were made in order to cash in on this business with lots pending. Then the boom dropped! At 8:00 pm the dishes were scanning the Clark Belt, the phone lines were buzzing; there was no game on the network.

As I was at the game in the press box, I thought I'd do some asking. No one was talking. We had some indication of what may come down last year. C.T.V., one of the networks carrying these games, sent out a directive for their affiliates to line up earth-bound terrestrial linkage to get the feed, but C.B.C., the carrier for this particular game, had always used Anik B, Transponder 11 (22 on the 24 CH format).

A postmortem, conducted by me the next morning, revealed many local taverns closed their doors 2 hours prior to game time and customers were in a festive mood. But at 8:05 pm, they were riotous after being forced to listen to the game on the radio. As sports fans will go to great extremes to see their team, I started digging around and solved the problem when I located a friend who watched the game on Anik C3. This is the 12 GHz bird which carries Pay TV in Canada. The disturbing thing about it is that it has 4 spot beams, meaning that different channels can be carried in different parts of the country with little overlap. If they moved a Toronto game to the east, west, or center west beam, Ontario residents could not receive the signal even if they had the equipment. The league would then have the added cost of microwave delivery for local coverage. By local, I mean 1,000 miles in diameter.

What Mr. Gadar (Canadian Football League Commissioner) and his friends are unaware of, is that for the cost of a dual feed, 12 GHz L.N.B.C. and receiver, these taverns are back in business. Some firms propose to rent this equipment as standby for the next game. Failing that, this writer knows how the carrier gets its feed from the stadium into the trunk and that this is in the general direction of many taverns so some of them will invest in steel snow slides soon.

Wouldn't it be nice if the C.F.L. had a director who had an eye for business and worked out an entrance fee with the hotel association, and everyone would be happy and rich. I should mention that there were very few empty seats in the stands. The attendance exceeded 39,000. Not bad considering the temperature was 95° at 10:00 pm.

Many tavern owners telephone to ask how they can tell if the game is on or not. The quick answer is they can not, although they can shorten their odds. The first thing to do is check your guide and if it is on E.S.P.N. which carries Canadian Football you can be 100% certain it is on Channel 7, Satcom 3 as E.S.P.N. uses satellite delivery exclusively in the U.S. and cannot resort to microwave. The second thing to do is go by the stadium a few days prior to the game and as TV stations love to advertise on their cameras, check the logo.

If the C.B.C. is carryng the game, invest in a 12 GHz upgrade. If the C.T.V. is broadcasting, keep listening in on this corner for ways around the blackout because local fans are fanatic about their team, and will go to great extremes in order to avoid the crowds in the stands.

Congratulations to Drake. They now have their E.S.R. 24 receiver C.S.A. and U.L. approved. Many hydro officials in Canada are now insisting on a hydro inspection of all equipment used that is not approved. Luxor comes with a hydro sticker, but lots of other manufacturers are oblivious to the underwrites laboratory.

It is important to note that insurance agents will tell you that if a fire results due to malfunction of equipment, and a claim is filed, they will disclaim it if it does not bear C.S.A. or U.L. listing. All receiver manufacturers that intend being around for awhile, please submit your equipment for approval and save people the aggravation.

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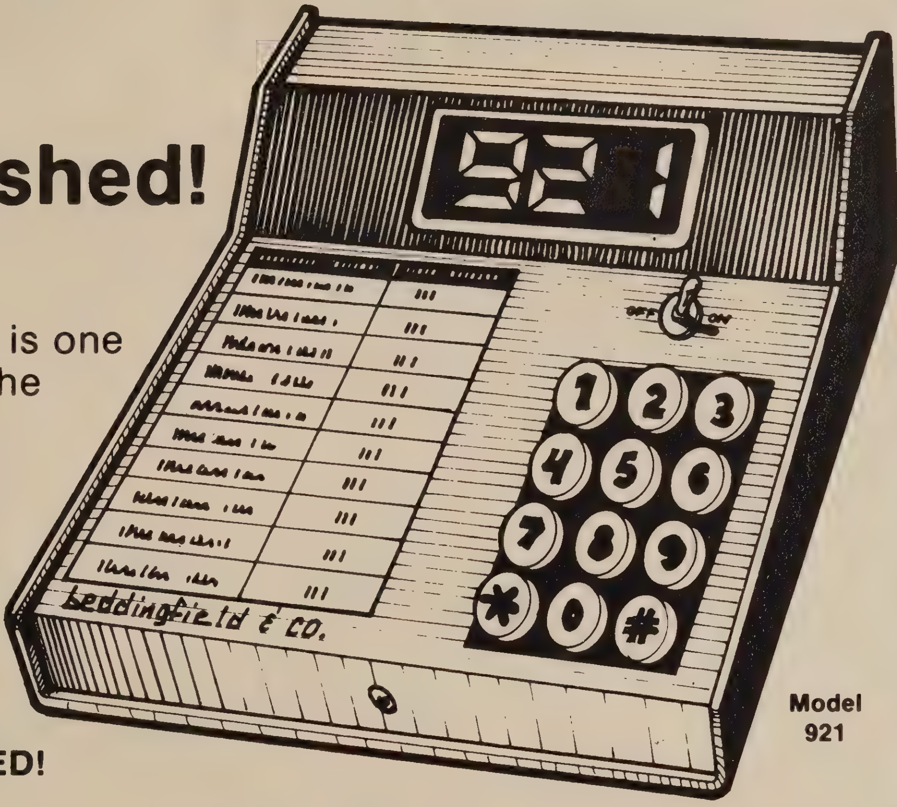

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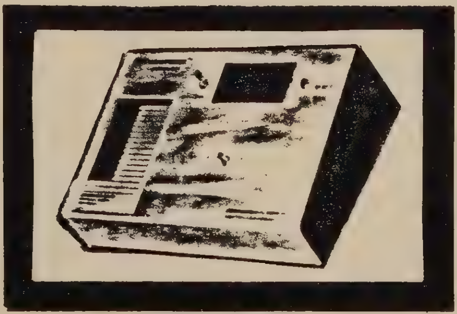
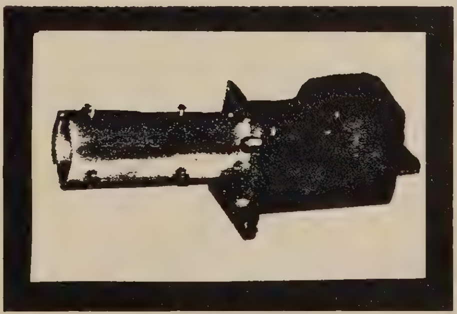


Model 821



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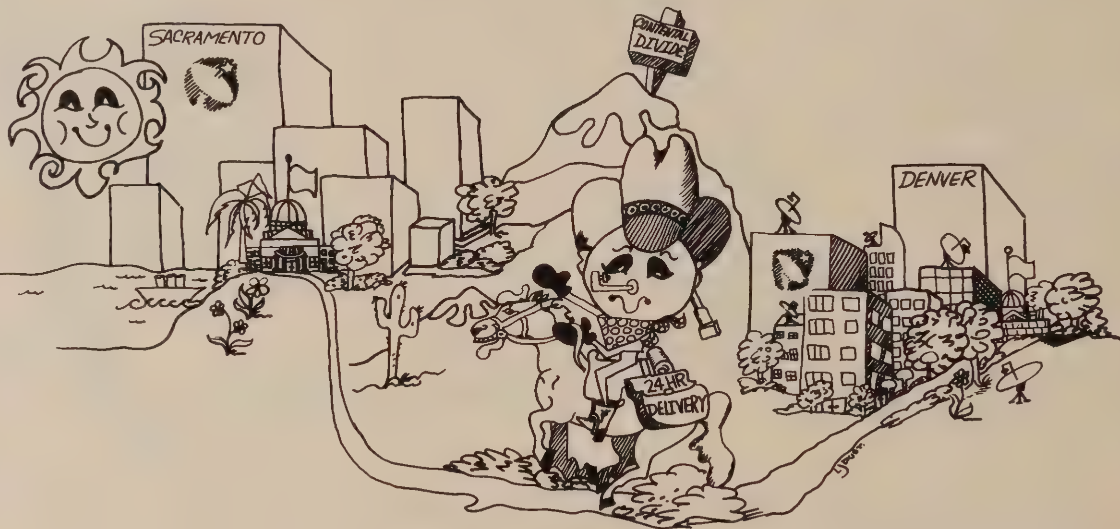

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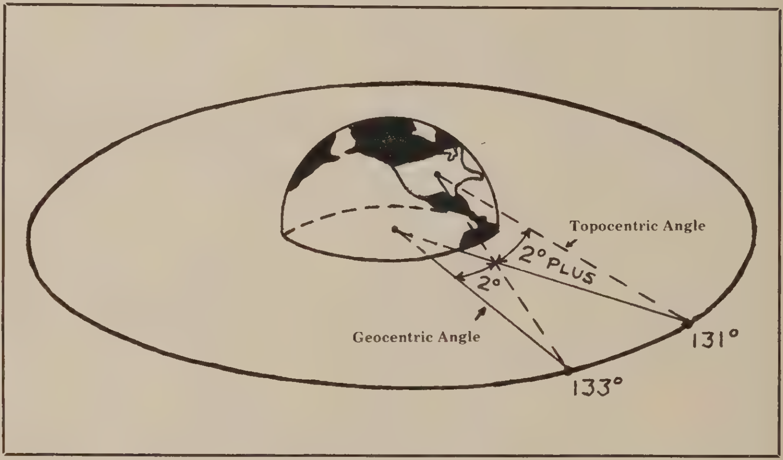
Is 2° Really 2°?

By Charles Schreiner and Martin Manley

to-po-cen-tric */adj/* relating to, measured from or as if observed from a particular point on the earth's surface.

geo-cen-tric */adj/* relating to, measured from or as if observed from a particular point at the earth's center.

After listening to several differing views, we decided to investigate for ourselves to find out how the angle between two satellites changes relative to one's position on the surface of the earth.



The angle associated with Satcom 3, for example, is 131°. This means that Satcom 3 is directly above the equator at 131° longitude. If a line were drawn from Satcom 3 to the center of the earth and another line were drawn from a hypothetical satellite at 133° longitude to the center of the earth, the angle formed would be 2°. However, on the surface of the earth, the angle between two satellites is affected by not only one's location, but also how far east or west the two satellites are.

The following chart represents the results of a computer program written to determine the angle between any two satellites at various locations in the United States.

	81° - 83°	105° - 107°	131° - 133°
Tacoma, Washington	2.14°	2.20°	2.21°
Goose Lake, California	2.17°	2.23°	2.23°
Santa Monica, California	2.20°	2.27°	2.26°
Grand Forks, North Dakota	2.20°	2.20°	2.16°
Topeka, Kansas	2.24°	2.25°	2.19°
Corpus Christi, Texas	2.29°	2.30°	2.23°
Bangor, Maine	2.21°	2.16°	2.07°
Raleigh, North Carolina	2.27°	2.22°	2.12°
Key West, Florida	2.31°	2.27°	2.16°
Honolulu, Hawaii	2.03°	2.15°	2.27°
Anchorage, Alaska	2.03°	2.09°	2.13°

Perhaps the most surprising aspect of the chart is that regardless of the location in the United States, including Alaska and Hawaii, that 2° spacing of satellites would in reality be greater than 2°. Also, the chart indicates an amazing consistency in the angles of ± .18° from the average of 2.21°. This is due to the great distances the satellites are from Earth.

Another use for this research was to find out how far a dish must pivot by 1990 in order to receive Satcom 5 at 143° and also to receive a Satcom bird at 67°. At this time it requires only 55° of dish rotation on the polar axis to go from F3 to F4. However, in a mere seven years, we will need 86° of motion. Simply put, this means that manufacturers of mounts and actuators must consider the future needs of TVRO buyers.

This is how the results were obtained for those readers who are mathematically inclined. To begin with, one identifies various satellites and locations using spherical coordinates. Next, the spherical coordinates are converted into rectangular coordinates.

$x = p\,(\sin\phi \cos\theta)$
$y = p\,(\sin\phi \sin\theta)$
$z = -\,(\cos\phi)$
p = distance from the center of the earth.
$\phi = (90° - \text{latitude})$
θ = longitude

Using the distance formula, one can then compute the distance between any two satellites as well as between a satellite and a point on the earth.

$$D = \sqrt{(x_1 - x_2)^2 + (y_1 - y_2)^2 + (z_1 - z_2)^2}$$

Finally, using those distances, one can form a triangle with two satellites and a point on the earth as the vertices. Now, the Law of Cosines will yield the angle of interest.

$$a = \mathrm{Cos}^{-1}\left[\frac{B^2 + C^2 - A^2}{2BC}\right]$$

Anyone who desires a copy of the computer program written in Basic language, can send to the following address.

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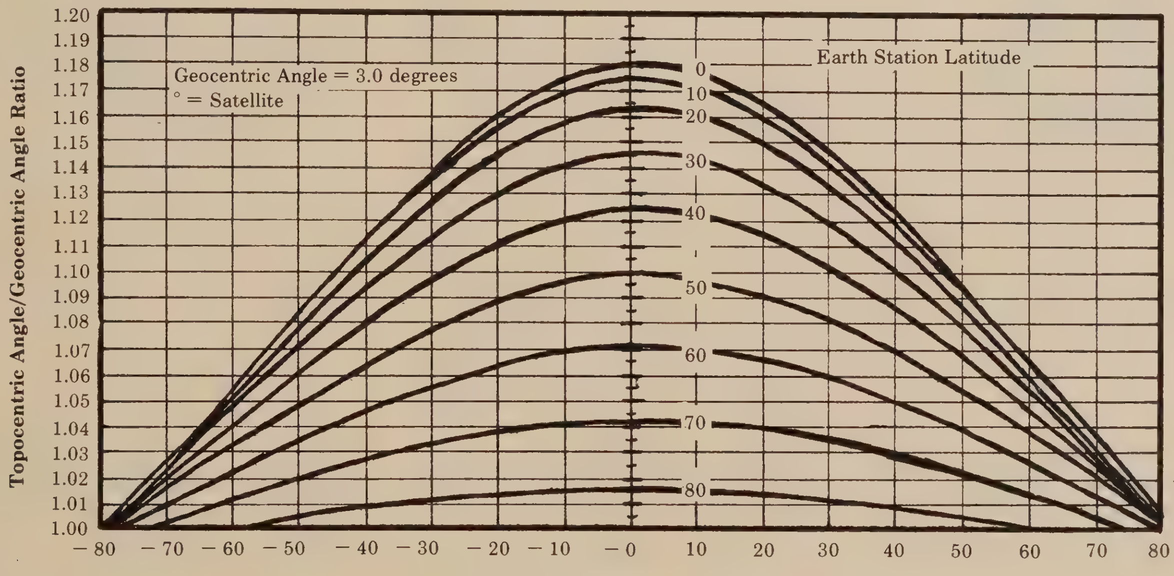
1 (913) 357-1662

EVALUATION OF TOPOCENTRIC VS. GEOCENTRIC ANGLES



Relative Longitude (degrees)

Reproduced Courtesy of Office of Science & Technology Technical Analysis Division of The Federal Communications Commission

RARC'S OVER AND DBS IS READY TO FLY

By Stan Prentiss

The 1983 Regional Administrative Radio Conference in Geneva, Switzerland has now met and adjourned, with the U.S. getting better than half the cake, but not quite the multi-meal mix it wanted.

A satellite hanging over Brazil's Sugar Loaf Mountain at 61.7° West longitude, and subject to 72 minutes of eclipse outages during March 21 and September 23 equinoxes, isn't exciting. Nor is a power flux density of -107 dB/meter^2 instead of -105 dB/meter^2 a rave item. But until the night before this meeting ultimately ended, there was no final agreement on anything, and it wasn't until the U.S. and Canada combined to push and shove a little, that the compromise became possible.

Now, according to U.S. delegation Federal Communications Commission engineer Bruno Pattan, we do have 32 channels assigned for each service area with passbands of 24 MHz, channel separations of 14.58 MHz, eight orbital positions at 157°, 148°, 119°, 110°, 101° that are satisfactory and three at 166°, 175°, and 61.7° that are somewhat questionable. The one at 175°, for instance, will have an elevation angle of only 10° for several western states.

POLARIZATIONS

Occupying a downlink between 12.2 and 12.7 GHz and an uplink from 17.3 to 17.8 GHz, downlinks within two contiguous areas require opposite sense right or left hand circular polarization for adjacent transponders. Uplink characteristics, however, are to be decided by individual countries and may be either circular or linear, but not both, depending on area coverage and/or technology. In case you're confused over power flux density (PFD), this is derived from $\text{PFD} = \text{EIRP} - 163$ dB (for any area), with the -163 dB figure originating from spreading factor $10 \log 4/\Pi R^2$, where R is the slant range.

Service area separations are generally set at 10°. Three or four channels may be supplied by a single satellite, and as many as eight satellites can form a cluster in positions not closer than 0.4°. If you'd like a usable equation to determine more or less precise separation between satellites, Mr. Pattan suggests; $S = R$ (slant range to satellite) times the angular separation (in radians).

HDTV

Naturally, the subject of high definition television was on the minds of the delegates, and our U.S. group seems to be thinking more of Britain's MAC (Aug. issue of Sat. TV Mag.) and also of brute-forcing pure HDTV via the Sony/Panasonic/CBS route. This would require strapping a pair of 24 MHz channels together and developing totally new wideband sets for the receive task. On the other hand, time division multiplexing of chroma and luminance within either MAC or RCA's new NTSC-compatible system would aid the cause substantially and requre only normal DBS bandwidth and standard transponder processing.

Regardless, bet your bottom dollar on domestic digital television receivers next year from two or more manufacturers who are already using ITT's sophisticated chips in projected systems.

WHERE DO WE GO FROM HERE

Of the eight DBS applicants who have thus far been approved by the FCC: STC, RCA, DBSC, WU, CBS, USSB, Video Sat. Systems, and Graphic Scan, all will have to re-file or amend their original applications to include RARC agreements, including satellite locations and technical parameters. If you'd like an educated guess, possibly only four of this group may actually launch due to the enormous expense involved.

★ ★ ★

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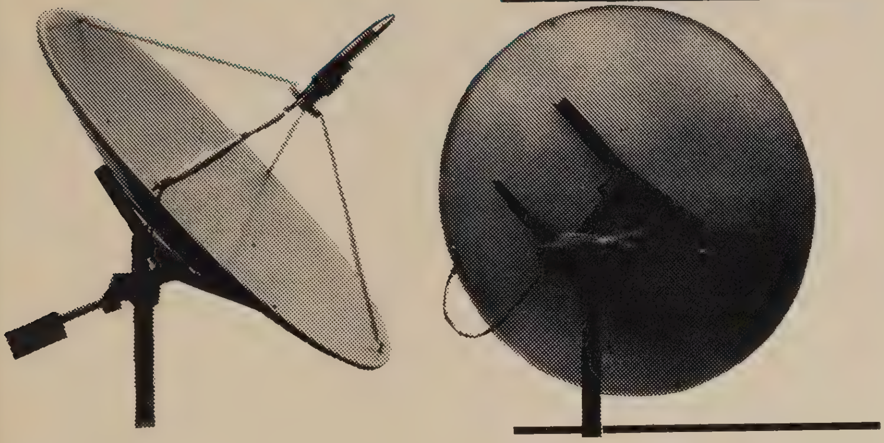

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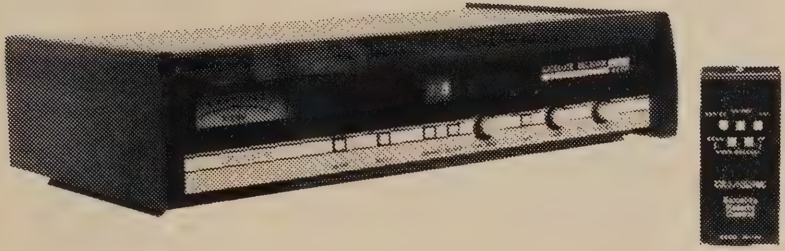

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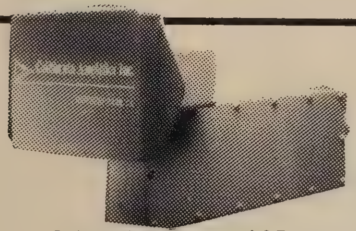

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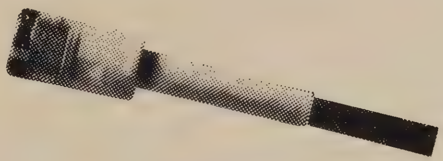

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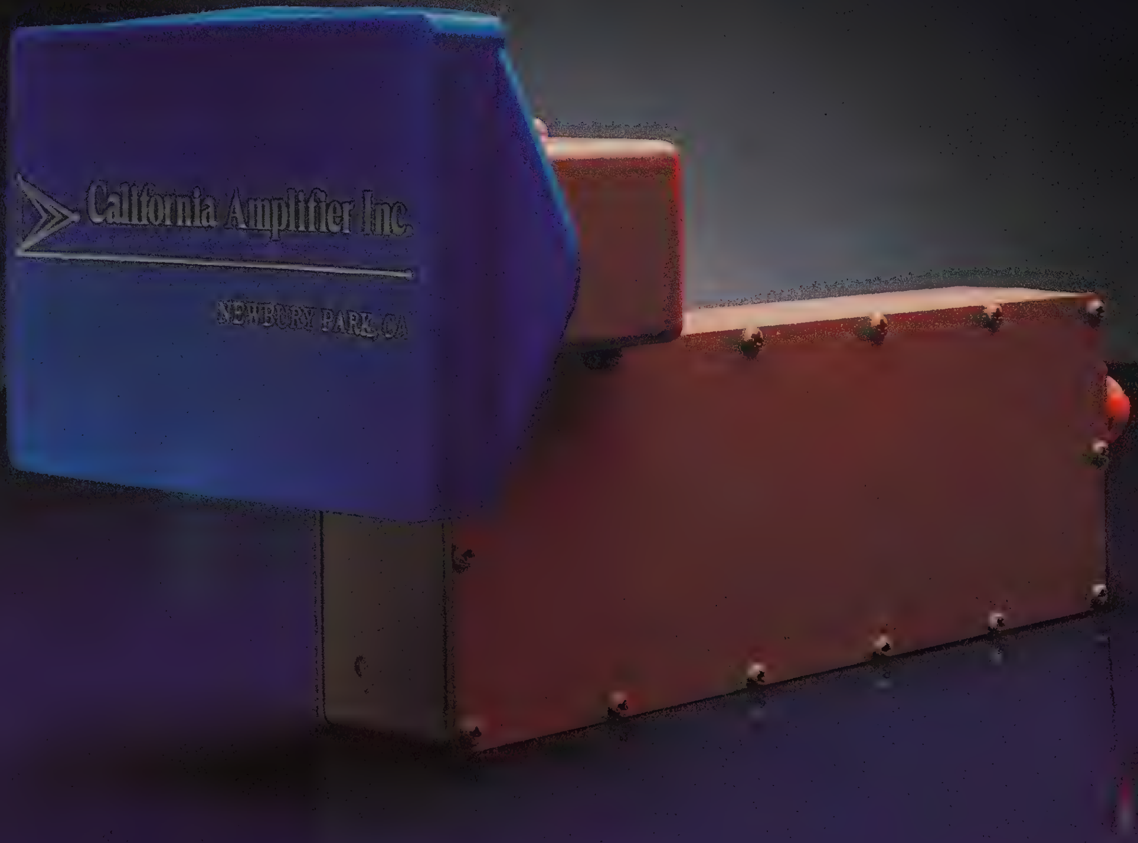

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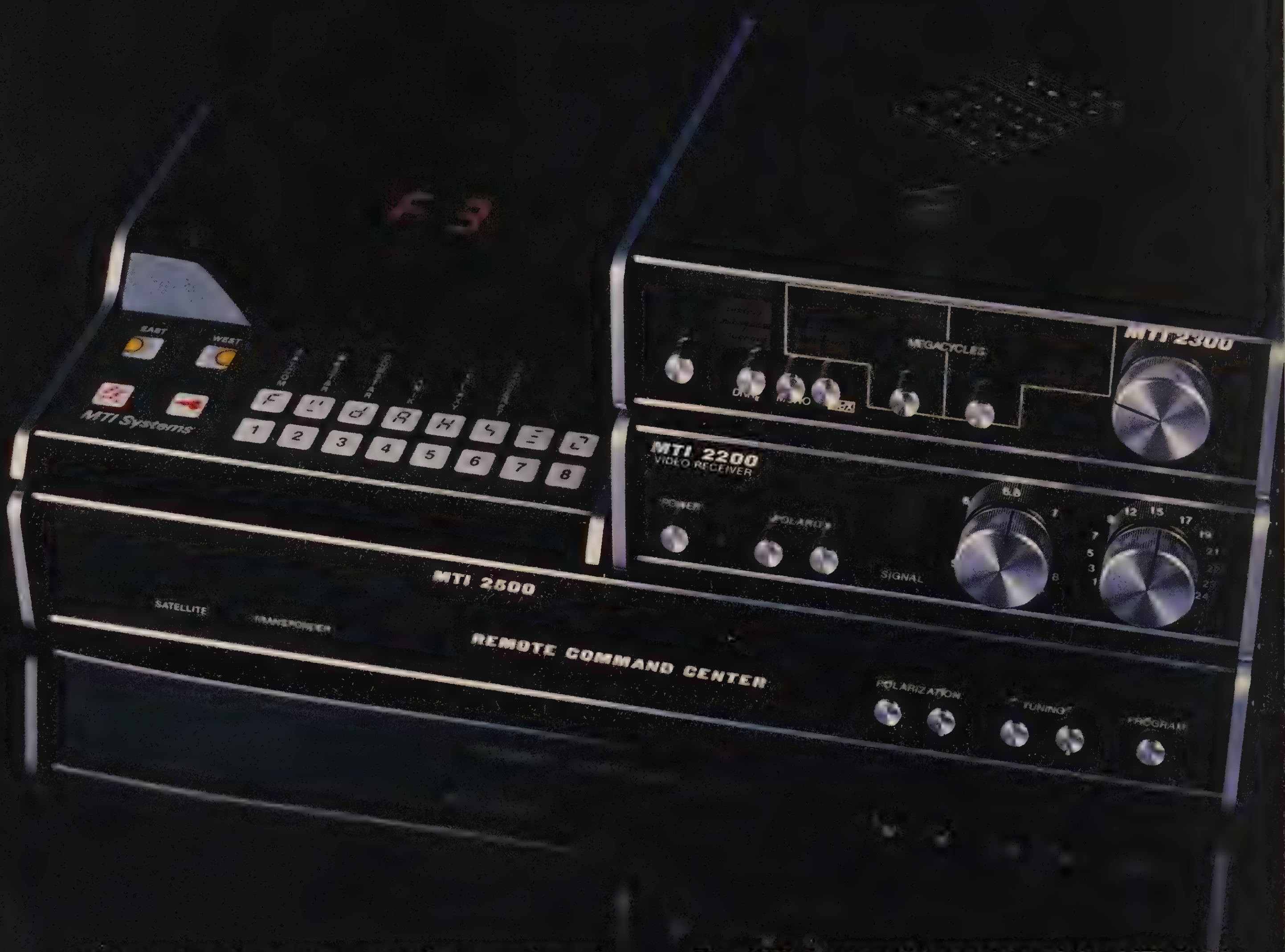
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News

The seventh Space Shuttle mission is now over, and NASA officials are calling it the "most successful" in light of it's complexity. The major disappointment with the flight came when dense clouds forced the cancellation of the first landing at Kennedy.

The most significant aspect of STS-7 was, of course, the presence of Dr. Sally K. Ride, The first American female in space.

Tests involving the Canadian-built arm went extremely well as did the deployment of the Indonesian, Canadian and West German satellites.

The eighth Space Shuttle mission is scheduled for August 21, but may suffer delays due to problems in checking out the TDRSS Satellite.

The TDRSS (Tracking and Data Relay Satellite System) was deployed from the Space Shuttle Challenger on April 4, 1983. The TDRSS Satellite began to have problems when a failure occurred while its Inertial Upper Stage (IVS) booster rocket was attempting to propel the spacecraft into geosynchronous orbit.

After some 58 days of delicate maneuvers a NASA team of engineers finally succeeded in placing the spacecraft in orbit 22,236 statute miles above the equator, using the tiny station keeping one-pound thrusters to boost the 5,000 pound spacecraft the extra 8,662 miles required.

TDRSS is scheduled to make tests with the STS-8 Space Shuttle mission, and will also be used with the STS-9 mission scheduled for late September.

STS-9 will also carry the Spacelab payload, the European Space Agency's orbiting research laboratory.

Indonesia's Satellite Palapa B-1 is now on station at 108° east longitude in geosynchronous orbit 22,300 miles above the equator. Palapa B-1 was launched from STS-7, and is the first of two second generation communications devices serving the Jakarta government's expanding telephone, telex, and television operations. Palapa B-1 replaced the two Palapa A devices orbited in 1976.

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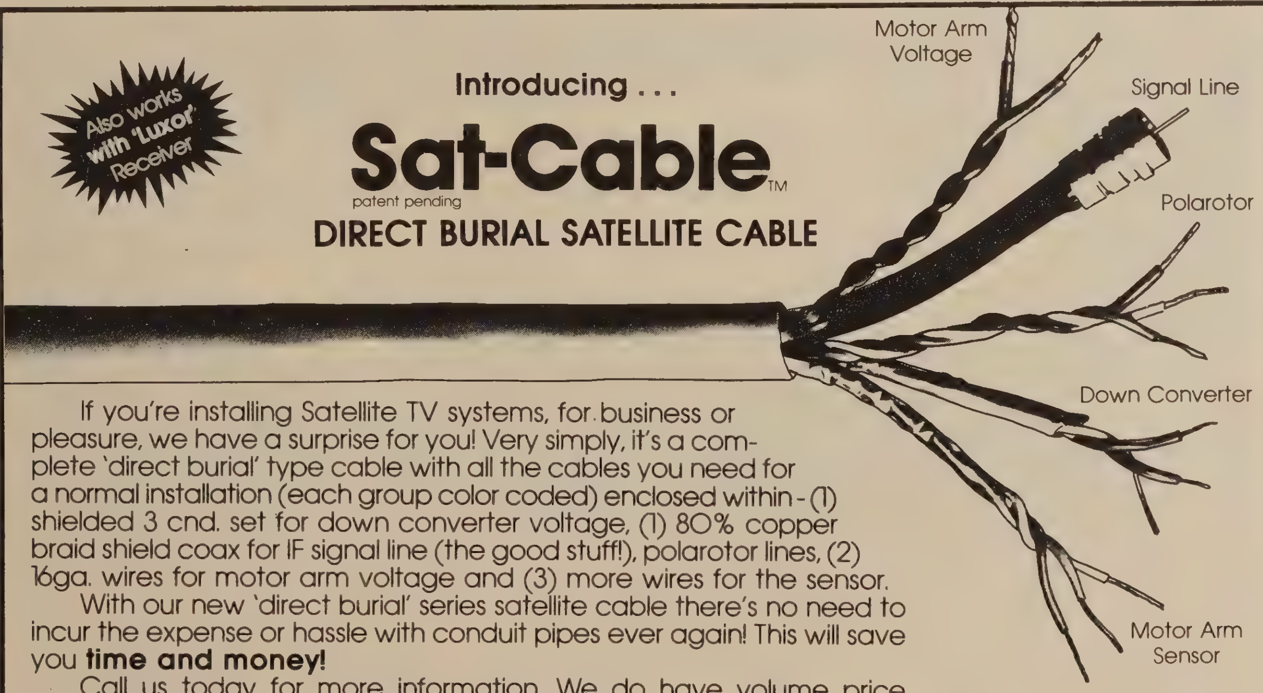

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link the far-flung islands of a country more than three thousand miles from east to west. The network aims not only at improving telephone and telex links for business, but also for expanding educational television among diverse population groups.

The Palapa satellites were designed by Hughes Aircraft and have a life expectancy of eight years. They are twice the size and power of the first generation Palapa A series and have 24 transponders.

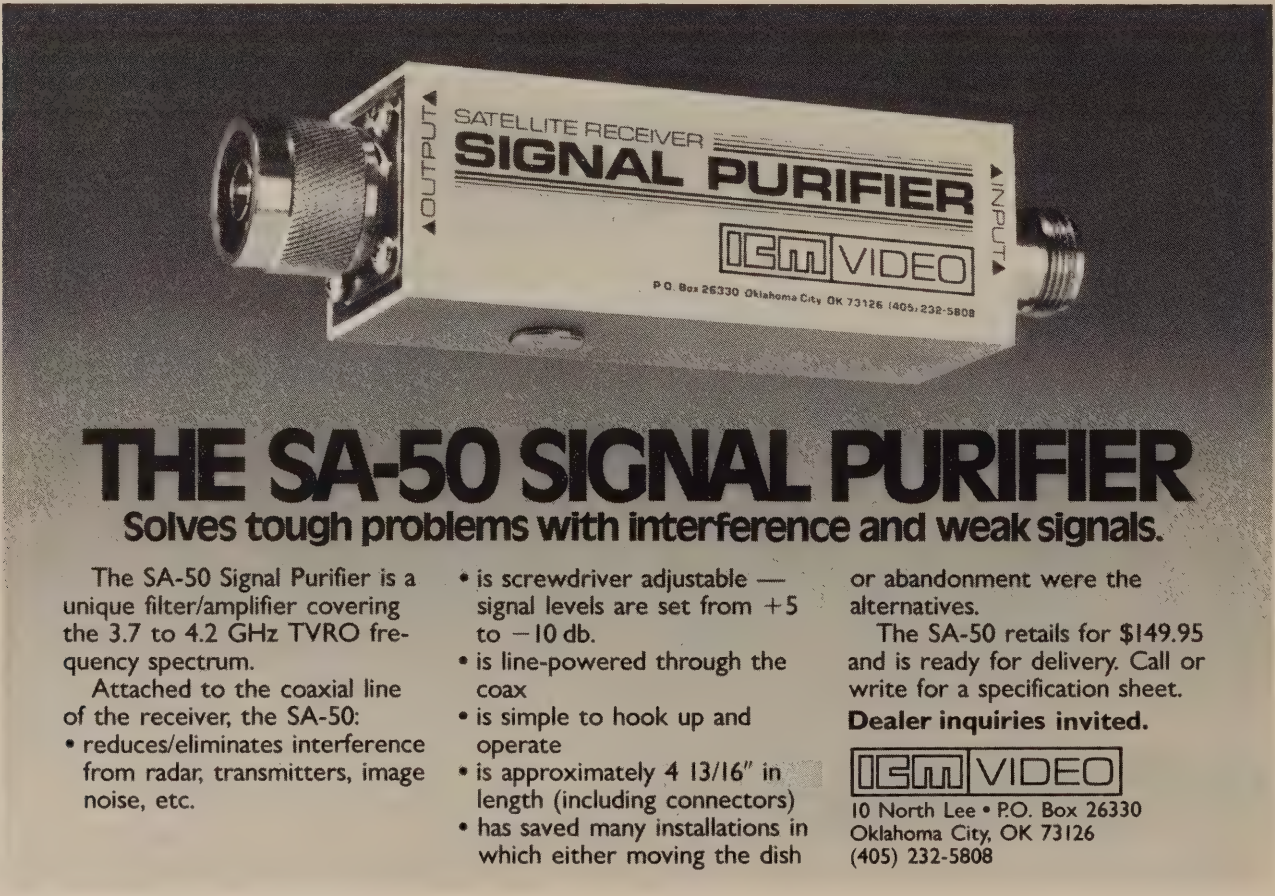
Satellite communications are an integral part and a unifying factor among the 13,700 islands of Indonesia. Besides serving Indonesia, the new satellites will play an important communications role in some states of the Association of Southeast Asian Nations (ASEAN).

M/A-Com to design IAST DBS System. According to Inter American Satellite T.V. (IAST), Pres. William Kommers, M/A-Com will be "system design consultants and will procure the equipment" for their entire interim DBS system. M/A-Com was chosen because of its leadership in manufacturing dishes and other satellite system equipment, according to Kommers. In a written statement released by IAST, Rupert Murdoch stated that the choice of the company to handle system design was a "major step toward making reliable, low cost ground equipment readily available to subscribers."

General Instrument recently received an estimated $600 million dollars to provide similar service for another early-entrant DBS company, United Satellite Communications, Inc. (USCI). The amount M/A-Com will receive has not been disclosed. Although General Instrument is in charge of procuring and distributing the system for USCI, the same M/A-Com equipment as in the IAST system will be used.

Britain. British Telecom International has announced plans to build London's first satellite earth station. The system will have two 13 meter dishes located at N. Woolwich, in the heart of the city's dockland. The earth station should be ready sometime in 1984 and will operate to the European Communications Satellite and to an Intelsat bird.

Continued on page 95



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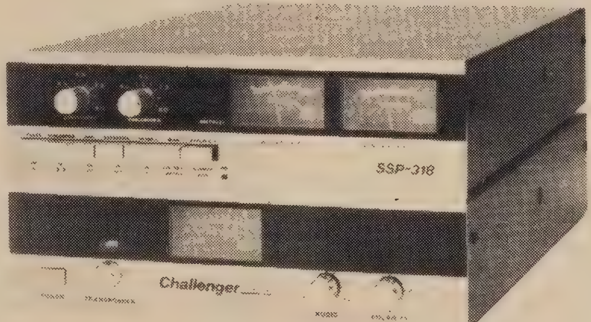

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DIRECT BROADCAST SATELLITES

— Interesting Times Ahead!

by Andrew F. Inglis

The following article is based on a speech given during the Annual Meeting of the American Institute of Astronautics and Aeronautics, Los Angeles, May 10-12, 1983.

DBS is one of the most exciting developments in the already exciting history of communications satellites. The concept of receiving a signal directly from a satellite by a small antenna mounted on one's roof has caught the public's fancy, and this has created an intense interest in the subject which is reflected not only in the trade press but in the general press as well. The technical, regulatory, and economic issues which are faced by this new service are great, however, and it is my purpose to describe not only its opportunities and promises, but also its problems.

Types of Satellites

The FCC has authorized three classes of commercial communications satellites which differ in their position in the spectrum and their operating power. They are usually described as "C-band," "K-band," and DBS. The basic features of these classes are shown in Figure 1.

Figure 1

COMMERCIAL SATELLITES

	C-BAND	K-BAND	DBS
DOWNLINK FREQUENCY (GHz)	3.7-4.2	11.7-12.2	12.2-12.7
POWER (WATTS)	5 to 8	20 to 40	100 to 250
ANNUAL LEASE ($ MILLION/TRANSPONDER)	1.5	3.6	10 to 15
RECEIVING ANTENNA SIZE (METERS)	5 to 15	1 to 5	0.4 to 1

Most of the communications satellites now in operation in the United States are C-band. The downlink signals from the satellite are in the range of 3.7 to 4.2 Gigahertz (billions of cycles per second), and they operate with comparatively low output power - 5 to 8 watts. A typical annual lease rate for a "protected" transponder, i.e., one which is provided with a back-up transponder which can be used in the event of its failure, is $1.6-1.8 million, per year.

The next class is K-band. These satellites, which are just coming into use in the United States, operate at a much higher downlink frequency - 11.7 to 12.2 Gigahertz - and with higher power - 20 to 40 watts. Protected transponders on 40 watt K-band satellites will lease for about $3.6 million per year.

Finally, there is DBS, the subject of this presentation. These will operate with downlinks just above K-band satellites in the spectrum, from 12.2 to 12.7 Gigahertz. (For the purists in the audience, I should point out that the spectrum location of DBS is also in the K-band.) These will operate at an even higher power - from 100 to 250 watts. The cost of these satellites will be very high, and it is estimated that protected transponders will lease for $10 to $15 million per year.

The bottom line in Figure 1 shows the effect of satellite power on receiving antenna size - the higher the power, the smaller and cheaper the antenna. Thus, there is a basic trade-off between satellite power and cost on the one hand and receiving antenna size and cost on the other. The optimum combination depends on the number of receivers - the larger the number, the more economic it becomes to increase the power and cost of the satellite.

For distributing programs to a few thousand cable TV systems, C-band is the most cost effective.

For distributing programs to apartment buildings, a service called SMATV, receivers will be numbered in the tens of thousands, and K-band will be the most economic.

Finally, as we shall see later, DBS becomes cost effective only if the receivers are numbered in the millions.

DBS System Configuration

The satellite is the basic building block of a DBS system. Figure 2 shows the specifications which are typical of the satellites which have been authorized by the FCC.

Figure 2

DIRECT BROADCAST SATELLITE SPECIFICATIONS

• NUMBER OF CHANNELS	3 to 6
• BANDWIDTH	16 to 27 MHz
• POLARIZATION	PROBABLY CIRCULAR
• WEIGHT	4600 lbs.
• LIFE	7 yrs.
• LAUNCH VEHICLE	SHUTTLE
• COST (6 CHANNELS IN ORBIT)	$125 MILLION

The number of transponders or channels per satellite varies from 3 to 6. This compares with 24 transponders in most C-band satellites. The number of transponders in the higher power DBS satellites is limited because of constraints on weight and power availability. Needless to say, this is one of the factors which increases the cost of DBS.

Most C-band transponders employ 36 Megahertz channels. DBS applicants have specified narrower bandwidths ranging from 16 to 27 Megahertz. This provides the potential for an increased number of channels which can be assigned to DBS. This is a trade-off, however, since it reduces the permissible modulation level of the frequency modulated carrier and this offsets some of the advantages of the higher power.

Nearly all communications satellites achieve double usage of the spectrum by frequency reuse. This requires some form of polarization discrimination to separate the two signals. C-band and K-band satellites employ vertical and horizontal polarization. Some DBS applicants have specified circular polarization where discrimination is achieved by right and left handed rotation of the polarization vectors. This is one of the parameters of the system which requires standardization, and it now seems likely that circular polarization will become the standard.

DBS satellites are heavy, almost twice the weight of the lower C-band and K-band satellites in spite of the smaller number of transponders.

This in turn leads to a requirement for more fuel for station keeping and a shorter life.

The greater weight also necessitates the use of the space shuttle as the launch vehicle.

And, finally, DBS satellites are expensive. The cost of an in-orbit 6-channel satellite is estimated to be in the order of $125 million.

System Concept

We now turn to the DBS systems concept.

Four orbital locations or slots will be assigned, one for each time zone, and several satellites will share the same slot. This is important because the antenna on your roof will be directional and can only pick up the signals from a single slot. One applicant has made a strong plea to the commission to reduce the number of slots to 3 and to combine some of the time zones. It seems likely, however, that the 4-zone format will be finally approved.

Each slot will be about 350 miles in the east-west direction and 90 miles in the north-south. With careful coordination, it will be possible to operate 6 to 8 satellites clustered in each slot without bumping. With this arrangement, as many as 40 TV channels could be broadcast from the satellites in a single slot, thus utilizing the entire region of the spectrum assigned to DBS. All of these channels could be received by a single roof-top antenna since they would all be within its directional beam.

With the systems arrangement just described, it would be necessary for a programmer to lease a channel on each of 4 operating satellites to provide complete coverage of the continental United States. In addition, the satellite carrier should provide at least one in-orbit spare which could quickly replace any operating satellite which might fail. It may even be necessary to provide two in-orbit spares since it is not certain that a single satellite antenna can be sufficiently versatile to provide a satisfactory signal from all of the time zone slots.

This will be expensive. It is estimated that the lease cost for a single channel on a complete system will be upwards of $50 million per year. The total lease rate for 40 channels, then, would be over $2 billion per year. Without attempting to be very precise, it would seem that this is considering in excess of the revenue capacity of the system for many years to come. The conclusion, therefore, is that the number of DBS channels which will become available in the forseeable future will be determined by economics, not spectrum availability. There is plenty of room there for everybody!

Uses for DBS

We now come to the most important question of all: how will DBS be used? How will these satellites fit into the total pattern of television program distribution?

To answer this question we must look at the complete gamut of television distribution systems. For purposes of this discussion, these can be divided into broad categories: terrestrial broadcast systems and nonbroadcast services (Figure 3).

In the first category, standard broadcast stations continue to provide the backbone of television program distribution in spite of the competition which they are receiving from other distribution systems. Their main competitors, cable systems, rely on standard broadcast signals for their basic service. Standard broadcast television will continue to prosper in the future, although its share of the market will continue to erode. It is limited, however, by the number of channels available and its almost total reliance on advertising revenue. It is these limitations, plus the inability of broadcast stations to provide satisfactory reception in sparsely populated and congested city areas, which provide the opportunity for other forms of program distribution.

Three other terrestrial broadcast systems are also shown in Figure 3: subscription or over-the-air pay TV, multipoint distribution service - a microwave distribution system, and low power television. Each of these will find a place where it will provide a specialized service.

Figure 3

TELEVISION PROGRAM DISTRIBUTION SYSTEMS

- TERRESTRIAL BROADCAST SYSTEMS
  - STANDARD BROADCAST STATIONS
  - SUBSCRIPTION TELEVISION (STV)
  - MULTIPOINT DISTRIBUTION SERVICES (MDS)
  - LOW POWER TV (LPTV)
- NON-BROADCAST DISTRIBUTION SERVICES
  - CABLE TELEVISION
  - SATELLITE MASTER ANTENNA TELEVISION
  - DIRECT BROADCAST SATELLITES

But the real competition for DBS will not come from these broadcast services but rather from nonbroadcast services, cable TV and SMATV. We will now evaluate this competition.

First, we have the cable system. Television signals which are received off-air from broadcast stations or satellites are distributed to single family homes and to apartment buildings by coaxial cable.

Next, there is SMATV. For a variety of reasons, apartment owners may be unable to connect to a cable system. By combining off-the-air reception of broadcast stations and satellites and connecting these to a master antenna system for internal distribution, they can provide a mini-cable service for their tenants.

Finally, there is DBS. Its natural market is single family dwelling units.

In estimating the size of this market, three issues must be considered:

(1) DBS vs Cable
(2) SMATV and DBS
(3) K-band vs DBS for Single Family Dwellings.

We will now discuss these issues in turn.

Figure 4 compares cable TV and DBS.

Figure 4

CABLE TV vs DBS

- BOTH COMPETITIVE AND COMPLEMENTARY
- CATV IS BASIC NON-BROADCAST SYSTEM
  - OVER 54 MILLION HOMES HAVE CABLE AVAILABLE
- CATV USES C-BAND FOR PROGRAM DISTRIBUTION
- CATV/DBS COMPARISON

	CATV	DBS
- COST PER HOME	$500 - 1,000	$500 - 1,000
- NUMBER OF CHANNELS	12 - 100	3 - 18
- LOCAL PROGRAMMING	YES	NO
- BROADCAST PROGRAMMING	YES	NO
- SATELLITE LEASE COST (ANNUAL CONUS COVERAGE)	$1.5 - 3 Million	$50 Million

- CONCLUSIONS: DBS WILL HAVE DIFFICULTY COMPETING WITH WELL MANAGED CATV SYSTEM

We note first that they are both competitive and complimentary. Neither is optimum service for all situations.

Cable television has been building for many years, and it is the basic non-broadcast distribution system. Presently, more than 54 million homes have cable available.

C-band satellites are almost universally used for program distribution. With only a few thousand earth stations required to provide service to most cable systems, the lower priced C-band service is the most cost effective.

But the key factors in the competition between CATV and DBS are shown in Figure 4.

The figures show that costs for connecting a home to cable or for installing a DBS receiver are about the same. You may have seen lower estimates for the cost of DBS receivers. We believe they are over-optimistic. Often they omit or underestimate significant items such as installation costs or descramblers. In short, we believe that the local distribution costs for cable and DBS will be about a wash. The competition, then will be won by the medium which can provide the best service.

Let us look at the number of channels or - from the viewpoint of the subscriber - the number of programs which would be available. CATV systems have a minimum of 12 channels, and these are mainly older systems. Newer systems have 36 channels and up and in some cases as many as 100 channels. Furthermore, the older systems are being upgraded rapidly, and within a few years we can expect that most systems will have at least 36 channels. The number of DBS channels which can be *economically* supported is uncertain, but it might be as few as three or as many as eighteen. The high number would be an optimistic forecast.

Cable can not only provide a large number of channels but it offers a greater variety of programming. It can distribute not only satellite transmitted programs but also locally produced programming and off-the-air broadcast programming.

Finally, the cost of satellite distribution is much higher for DBS than for the C-band service which is now employed by the cable industry.

The conclusion which one must draw from this comparison is that DBS will have a very difficult time in competing with well-managed cable systems which provide a variety of services with good technical quality.

Let's now consider the relationship between SMATV and DBS, summarized in Figure 5.

Many apartments and condominiums or MFDU's will choose to use SMATV rather than cable. The issue is whether DBS or K-band will be used for satellite distribu-

Figure 5

SMATV and DBS

- MANY MULTIPLE FAMILY DWELLING UNIT (MFDU) RESIDENTS WILL USE SMATV
- DBS COMPETITION IN SMATV MARKET IS K-BAND SATELLITES
- K-BAND/DBS COMPARISON - MFDUs

	K-BAND	DBS
- EARTH STATION COST	$3,000 - 5,000	$500 - 1,000
- SATELLITE LEASE COST	$3.6-7.2 Million	$50 Million
- (ANNUAL CONUS COVERAGE)	1984-1985	1986
- AVAILABILITY		
- PROBABLE NUMBER OF PROGRAMS	12 - 24	3 - 12

- CONCLUSION: K-BAND WILL PREDOMINATE AS SATELLITE DISTRIBUTION MEDIUM FOR MDFUs tion to SMATV systems. Figure 5 makes this comparison.

DBS has a clearer advantage in the earth station cost. This is a direct result of the higher power which permits smaller earth stations to be used.

The saving in earth station costs, however, is overwhelmed by the far higher cost of satellite distribution. If the number of earth stations were numbered in the millions, the added cost of the satellites might be cost effective; but with the tens of thousands of earth stations required for SMATV, the trade-off favors K-band.

K-band also will have the advantage of earlier availability - probably at least two years during which it can become firmly established.

Finally, the lower cost of K-band distribution will probably result in the availability of a larger number of programs on K-band satellites.

It appears, therefore, that K-band will predominate as the distribution medium for MFDU's.

There is one industry group which is taking the position that K-band is not only the preferred medium for multiple family dwellings but that it will predominate for single family dwellings as well (Figure 6). It argues that antennas with diameters of 1 to 2 meters are economic and practical for individual homes as well as for apartment and condominium complexes. If one accepts this premise, all of the factors favoring K-band for SMATV - a head start and wider program choices - would apply to single family units.

Figure 6

K-BAND FOR SINGLE FAMILY DWELLING UNITS (SFDUs)

- ONE INDUSTRY GROUP PLANNING K-BAND CHALLENGE TO DBS FOR SFDUs
- ARGUMENTS
  - 1 TO 2 METER ANTENNAS ARE ECONOMIC AND PRACTICAL FOR INDIVIDUAL HOMES
  - K-BAND WILL PROVIDE MUCH WIDER PROGRAM CHOICES BECAUSE OF LOWER SATELLITE COSTS
  - K-BAND WILL HAVE HEAD START
- MARKETPLACE WILL DECIDE!

This is an issue that will be settled in the marketplace and probably during the next two or three years.

DBS Prospects

So far, we have discussed the segments of the market where DBS would have difficulty competing, and this may have given an overly pessimistic impression. There is in fact a prime potential market for DBS. It is single family dwelling units which are not receiving satisfactory cable service.

This is a substantial market. It includes areas which do not have cable or where cable availability will be long delayed. It includes areas where the number of channels on the local cable system is limited. It includes areas where the cost of cable service is inflated by unrealistic franchise fees. And it includes areas where the cable TV service is poor.

In total, it is estimated that the potential DBS market is 15 to 20 million homes. This is far from the 80 million homes in the country, but it is still very substantial. Our studies show that a DBS system could be profitable for a programmer if 5 million of these homes installed DBS receivers. By comparison with the penetration of CATV in its market, this would not appear to be an unreasonable prognosis.

In the end, however, the success of DBS will not be determined by technology or, within limits, by costs. It will, rather, be determined by the variety and quality of programming which becomes available. Given an attractive program schedule, which, in many locations, cannot be obtained from other distribution systems, it would seem that the market penetration could reach profitable levels.

Some Conclusions

I will conclude this presentation with a brief report on the current status of DBS in terms of regulatory, technical and commercial considerations.

The regulatory situation is summarized in Figure 7.

Figure 7

CURRENT STATUS - REGULATORY

- FCC HAS GRANTED PRELIMINARY AUTHORIZATIONS TO 8 COMPANIES
  - RCA
  - STC
  - CBS
  - VIDEO SATELLITE SYSTEMS
  - DBSC
  - WESTERN UNION
  - GRAPHIC SCANNING
  - USSB
- ALL AUTHORIZATION LIMITED TO ONE OPERATIONAL SATELLITE
- ALL AUTHORIZATIONS SUBJECT TO TERMS OF RARC AGREEMENT, SUMMER, 1983
- FCC HAS NOT ESTABLISHED TECHNICAL STANDARDS TO ASSURE COMPATABILITY

The FCC has granted preliminary authorizations to 8 companies to begin construction of DBS systems. The terms of the authorizations provide that initial commitment of funds must be made by December, 1983 and the system must be completed in five years.

These are initial authorizations, and they are limited to one operational satellite for each applicant.

There will be a convention of RARC, the Regional Administrative Radio Conference, in Geneva this summer. The establishment of policies and frequency allocations for DBS systems is an important agenda item. All of the FCC's authorizations are subject to the terms of this agreement.

The FCC authorizations include no technical standards, not even those which would assure compatibility. The ability of receivers to pick up signals from all of the satellites in an orbital slot is a requirement for the economic success of the system. If compatibility standards are not set by the FCC or by the RARC agreement, it is likely that the de facto standards will be established by the first company which launches a satellite. For the most part, the standards proposed are sufficiently alike that no major problem of compatibility is foreseen.

One exception is the high definition television systems which is proposed by CBS. This would require non-standard television receivers of a new design. CBS asserts that technology has progressed to the point where high definition television is feasible and that DBS provides a unique opportunity to introduce it. A discussion of this issue is beyond the scope of this presentation.

The most difficult technical problems in DBS may be the mundane ones of receiver design.

The basic technology for DBS satellites is available. While major development work of a high level of sophistication will be required, there are no technical problems requiring dramatic breakthroughs. Further, recent successes would indicate that the space shuttle is a satisfactory launch vehicle.

The design of the receiver system will be a challenge. It must be extremely low priced, and it must perform well and reliably with very little maintenance. It must be capable of easy installation. And since many or most of the programs will be pay TV, it must have a system for addressable descrambling which is both secure and inexpensive. Manufacturers are working very hard on these problems today, and we can be reasonably certain that satisfactory answers will be found.

As to the current commercial status of DBS, to date, only one applicant, STC, has actually placed an order for a satellite. We were pleased, of course, that RCA Astro-Electronics was selected as the contractor.

The other applicants, including RCA Americom, are now in the planning phase. The planning efforts include serious dialogues with their potential customers, the program suppliers.

The program suppliers, too, are engaged in a major planning effort. This is a new industry, and no clear pattern has yet emerged. It is generally agreed, however, that a premium pay service will be required to make the business of supplying programs profitable. One proposal is that the programmer would offer a "package" which would include a pay TV service plus two advertiser-supported channels - perhaps sports and news.

Program suppliers are also giving attention to the massive task of sales and service. This is no small problem. Imagine for example, the magnitude of the system which would be required just to do the billing and collection for 2 million subscribers scattered over the entire 48 states.

To summarize - a very large amount of planning effort will be required before any of the participants in this business, the program suppliers, the satellite operators, receiver manufacturers, and service organizations will really be in business.

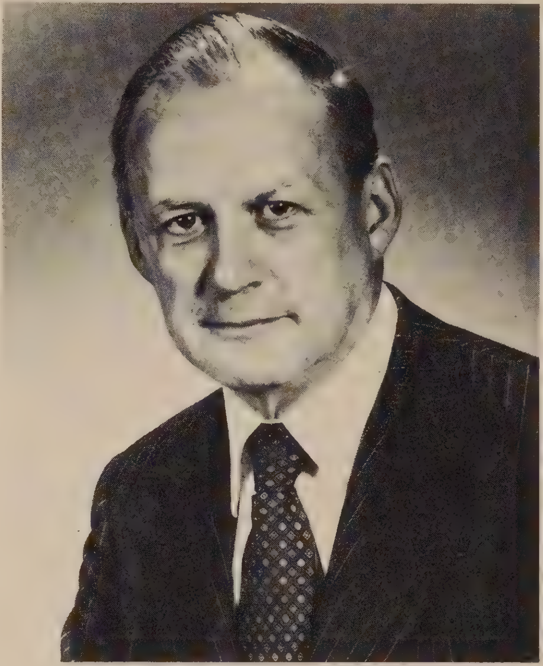
And so, what is the bottom line?

DBS is certainly exciting!

Any prudent assessment would have to conclude that it is a high risk business which will require large investments for physical plant and programming.

On the other hand, it offers the potential for very large profits if it is successful.

One can only say that there are some very interesting times ahead!



Mr. Inglis served as President of RCA Americom Communications, Inc. from January 1977 to February 1983, when he was elected Vice Chairman. He retired from RCA Americom on June 1, and presently serves as a consultant to the company.

The above article reprinted from the July 1983 edition of Satellite Circuit. Special thanks to RCA Americom, the American Institute of Astronautics and Aeronautics, John Williamson and Andrew F. Inglis.

"GOSH, THEM THINGS ARE POPPIN' UP EVER' PLACE!!"

COTHRAN

Satcom I-R Joins Americom Fleet

Newest Spacecraft Now Operational

Satcom I-R, the newest and most versatile C-band domestic communications satellite ever to be orbited by a Delta launch vehicle, went operational in May following its on-schedule launch at 5:39 p.m. (ET) on April 11.

Positioned at 139 degrees West longitude, the spacecraft replaces Satcom I, RCA Americom's first satellite, which has been in service since 1976. Satcom I has been relocated from 135 degrees to 119 degrees, where it is colocated with Satcom II. Both spacecraft now serve as one. They are expected to remain on station for several months until their supply of station-keeping fuel is nearly exhausted, after which they will be retired and removed from geosynchronous orbit.

Multiple Missions

The versatility of Satcom I-R stems from its mission. It is designated as an in-orbit spare to protect not only the Alascom, Inc., satellite Aurora (Satcom V: see Satellite Circuit 1983 No 1.) but also RCA Americom's other operational spacecraft in the unlikely event of an in-orbit satellite failure. Should it be required for Alaskan service, the new spacecraft has the capability of switching its antenna pattern to put a high signal strength into that state; 39 dBw effective isotropic radiated power (EIRP) vs. a nominal 34 dB W for typical service.

Otherwise, Satcom I-R's mission is to carry RCA Americom's digital audio transmission service for radio networking, and its new television channel service.

Digital audio transmission service is being used by the major radio networks to distribute high-quality stereo or monaural programming to their affiliates on a regional or nationwide basis at one low cost. Television channel service is being used to assemble specialized or ad-hoc networks to cover special events; to distribute sports, cultural or entertainment programming on a syndicated basis, and to provide other services such as videoconferencing.

Second Advanced Satcom

Following Satcom V, Satcom I-R is the second domestic communications satellite to employ 8.5-watt solid-state power amplifiers, elliptic function filters and a shaped-beam antenna that together provide improved performance and reliability over earlier spacecraft. The third in the series will be Satcom II-R, which will replace Satcom II, launched in March 1976.

This article was reprinted from the July 1983 edition of Satellite Circuit. Special thanks to RCA Americom.

Liftoff for Satcom I-R, the newest spacecraft in the RCA Americom fleet, occurred at 5:39 p.m. (ET) April 11. The Advanced Satcom is being used to carry digital audio transmissions for radio networking, television channel service and voice/data/video traffic throughout the United States.

(NASA photo)

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In Alaska, the satellite television and communication industry is essential for a state with a population of 475,000 and an area 1½ times the size of Texas.

Alaska

The Land of the Midnight Sun is Meeting the Dawn of New Technology

By Tim Olin

What a difference a day makes! Well, really what a difference a year makes. The advent of satellite TV has changed many concepts keeping isolated individuals and families updated on news and events in other parts of the U.S., Canada and (if you understand Spanish) Latin America. As we noted in the July issue of "Satellite TV Magazine", the state of Alaska has appropriated funds for the purchase of 100 - 4.5 meter earth stations to serve remote villages. I visited 4 of those remote villages while commercial fishing during June and July of '83. Prior to that I had been in those villages while fishing in the summers of '78 through '80. What follows are my first hand observations and impressions.

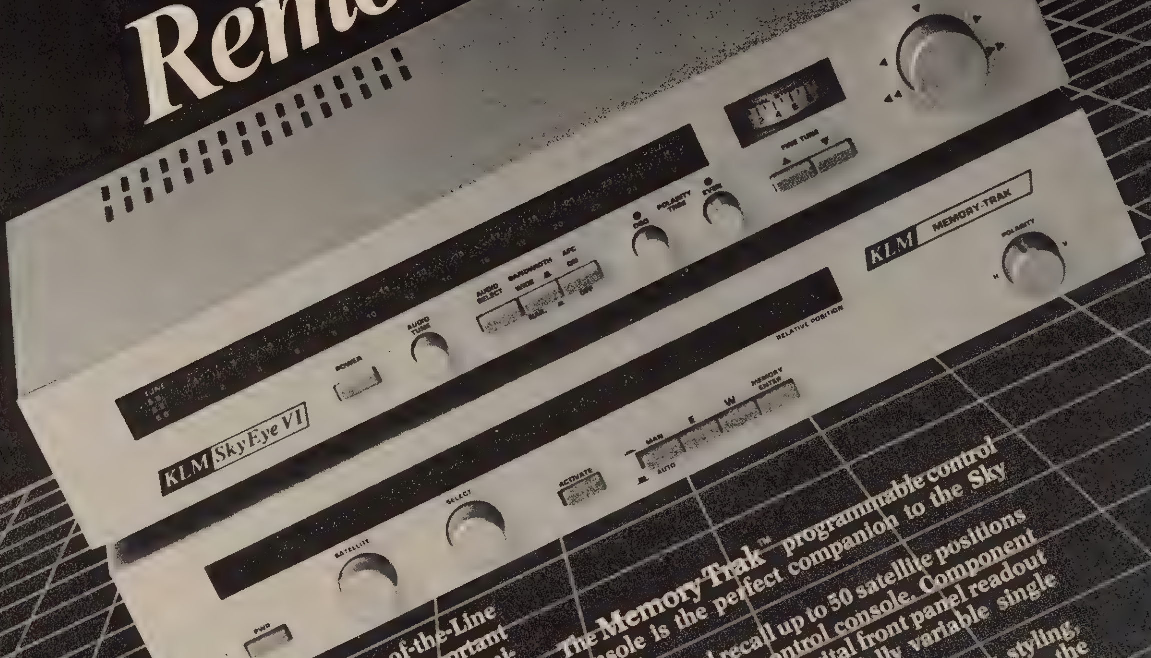
The year Seattle won the NBA championship was the big year for fishing in the Bristol Bay. As many fishermen and cannery workers are from Seattle, the event of the day was any early morning visit to Fisherman's Bar for the off-air live broadcast of the game. In '83 it was the 76ers live via satellite on a Sony big screen - in living color, 16 foot dish, KLM Sky Eye Receiver and actuator. Two of the bars in Naknek have them. Unfortunately one went down in a big wind, collapsing when the actuator broke down and they didn't get it in the stall position (pointed straight up). The antenna company is sending them another antenna at no cost but the bar must pay the freight. The last time the freight bill came to $800.00.

Eggegik is a small village near the mouth of the Eggegik River and two dishes were in use there. One was an Odom and the other an Anixter. Phone service and the Alaska Satellite TV Project were provided. One of the dishes was next to the village clinic and was anchored by three cement pads as well as three cages of large rocks. A fairly unique installation for sure, put probably necessary. One of the antennas seemed to be experiencing LNA problems as a ladder stood in front of it the entire two days we were there. If it was something major I'm sure the down time would be considerable as there are few TVRO stores in the bush.

I was in King Salmon one day and saw a couple of guys prying heat tiles off the back of Alascom's dish. The antenna was an Anixter with a specially built mount. I talked with them a while until it started raining too hard to stand looking up and continue the conversation without drowning. The dish was four years old and the heat tiles would not prevent ice build up. There is a small Air Force base at King Salmon and they said the commander didn't particularly care for the phone communication interruptions especially in the interest of national defense. I did visit with them long enough to find out that the two men were Alascom employees and they traveled around installing dishes and taking care of them. They went on to say that most of the dishes that they used were Anixters, S.A.'s and Harris.

There also was a TVRO installation at the Air Force Base that provided 4 channels of viewing. They had their dish for about a year and in that remote duty it was greatly appreciated. After talking to many of the people around the area the next best thing to the entertainment a dish brings is the fact that events were brought to them immediately. It seemed that although they were in very remote areas they still could observe what was going on in the "outside" world. (Outside being the lower 48 states.) In some ways they have the best of both worlds. They can stay in touch with the rest of the world, but when it gets to be more than they want they can simply turn it off and melt into one of the most remote and beautiful places in the world. Alaska, prime country not only for the use of satellite technology, but also for getting away from it when you choose to. ★ ★ ★

introducing Sky Eye™ VI with optional Remote Control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POWER
AUDIO TUNE
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BANDWIDTH
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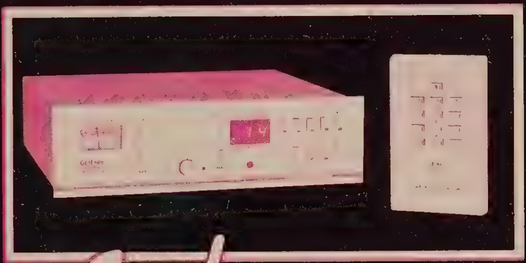

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Solar Sail Race to the Moon

By Jeffrey Manber

Imagine long sheets of aluminized plastic, just micrometers in thickness, unfurling like sails in the emptiness of space. Imagine not one but three of these spacecraft, slowly moving in a wide orbit above the earth, directed by radio signals from the ground.

It is sometime in 1986, at the start of the solar sail race to the moon. And not since the first airplanes raced across the Atlantic will a single race attract the attention of the entire world, and also introduce in dramatic fashion a new type of transportation.

Three years before the start of the race, French engineers organizing the event must still overcome some major hurdles. The solar sails must be built; corporate sponsors must be found and there must be other solar sails able to compete. Both the Japanese and Czechs are designing their own solar sails, but the leading organization, the World Space Foundation in California, has so far declined to participate in the event. They believe a race would serve no technological purpose and should be delayed until solar sails are more sophisticated.

Maybe it should be delayed. But what an idea! Had the early aeroplane races been postponed for the same reason, it might have taken a decade to advance beyond the Wright brother's machine and a generation before air travel was commonplace. Solar sails are also an idea which has been speculated on by both poets and engineers. The very simplicity of ships hurling

Pictured at left: WSF ½ size prototype sail fully deployed - full size prototype sail is nearing completion with an expected test deployment by the end of the year.
Credit: R. Dowling, Metavision/World Space Foundation.

through space, powered only by light from the sun, able to roam virtually forever, is a powerful image.

Solar sails will rely on two ever-present forces; the pull of gravity and the push of photons, which are particles of light. Navigating like sailing ships on the ocean, these craft might one day become the preferred vehicles for carrying freight between space stations, on interplanetary missions or even for moving small asteroids to floating bases where the raw materials will be used for space industries.

Within a few years, geostationary satellites might all have small solar sails, to keep the satellites within their assigned location. Sails could be used instead of fuel to constantly nudge the satellite back to the proper location, as has already been done on the European communication satellite, OTS.

Within a few years, geostationary satellites might all have small solar sails, to keep the satellites within their assigned location. Sails could be used instead of fuel to constantly nudge the satellite back to the proper location, as has already been done in the European communications satellite, OTS.

Solar sails might also be used to relieve the overcrowded geostationary belt. If commercial satellites were fitted with large sails, the geostationary orbit could be "lifted" by maintaining positions above the crowded equatorial plane. This is not done now because of the expense of holding the desired position with a fuel-consuming satellite. The number of slots would greatly increase, thereby solving the many political and technological problems caused by a bumper-to-bumper geostationary belt.

So why bother with a race? It appears likely that solar sails will be able to contribute to our exploration of space. But many of the engineers now working on developing this new form of space transportation fear that the government will continue to ignore solar sails, especially since there are no major aerospace corporations which stand to profit from their use. In 1973, NASA approved of a solar sail mission to Haley's Comet, but the program was cut five years later. Many believe a race would serve as an emotional catalyst, prompting support on both a private and public level.

There is another reason. That of too few people realizing the beauty and wonder of space. Not since Armstrong's walk on the moon has a space event captured the world's attention. Members of U3P, many of whom also work for the European Space Agency, believe the solar sail race would excite the public as now only science-fantasy movies or UFO's seem capable of doing.

The race itself is suprisingly simple to describe. The fragile solar sails must be first carried into orbit by a launch vehicle. The preferred rocket is the French Arianne, because it ejects payloads into a higher orbit than the shuttle. Once in orbit, those controlling ships from the earth will send a series of radio signals causing the crates to open, the sails to unfold and the race to begin.

The sails will be positioned for directing the craft into a high earth orbit. With little mass and constant force from the stream of photons, the solar sails will gradually increase in a speed until, almost a month later, they will be traveling faster than a typical rocket. To assure public interest during the long race, each craft will have a package of cameras, ensuring spectacular shots of the earth, moon, sun and the other two ships.

As the solar sails pick up speed, their orbits will be further and further from the earth, and closer to the moon. The race organizers believe it will take 100 orbits and almost a year to finally pass behind the plane of the moon. The winner will be the first solar sail to lose contact with the earth, meaning it is on the far side of the moon.

A solar sail race to the moon will have many practical benefits. When finally completed, an amateur network of space vehicles and equipment will be in operation, free to explore other parts of our solar system. Public interest in space will undoubtedly be at an all-time high, and corporate sponsorship might mean funds for additional research. Much will be learned from a year-long race, and a second generation of solar sails will already be in development.

Meanwhile, somewhere off in space, the first clipper ships of the future will be riding an ocean with a different sort of wind, mapping routes for other sails sure to follow.

★ ★ ★

WESPERCOM'S PORTLAND SHOW

By David Day

Remember the Frank Sinatra song lyric "There was a girl in Portland before the Winter's chill - We used to go out walking on October Hill" ..... well the Portland Show was just such a nice compact, sweet, down home affair. It was number three and third time lucky.

The exhibitors' list read like our industry 'Who's Who' and a speakers' schedule that would have been the envy of much larger Shows.

The Portland Coliseum was a perfect setting and the staff were ultra polite and helpful. It was well promoted and despite it's extreme N.W. location was well attended. Tay Howard was delighted to find Southern California weather and said so, giving a fine Seminar lecture, in a style that we now have come to expect. If some of our industry leaders were as modest as this gentleman, it would make a refreshing change.

The outside antenna farm looked productive in the fertile Oregon landscape with more and more plastic 'Leggo' kits seen, in readiness for the forthcoming mass merchandising plan.

Show organizer, Evelyn Kessler, did a great job of organization. The day before the Show, she was functionally dressed and had her job well in hand. On opening day, she had changed and looked so attractive that even your old scribe began thinking of October Hill again!

All seats in the Seminar Room were completely filled, with more standing to hear twelve industry leaders speak on a variety of well chosen TVRO subjects. Ted Anderson, President of Automation Techniques, who manufactured that 'Great Little Receiver', gave an interesting address and slide presentation aided by his daughter. My pleasure to meet such a refined young lady.

Mary Olson of Conference Cassettes told me how well their Audio Recordings had been received. Leading companies like Amplica purchase their products so their progressive sales department can keep well informed. Optimum activity for their new Optimized Systems. They had outside displays, inside displays and Jerry Moore speaking. Burt Ashens, Sales Manager, leads his team well but I did miss Harvey Merade who sorted out our LNA problems in the past.

Wespercom's David Thomas introduced the speakers and managed just as well as seen in Washington, D.C. He is a good speaker with the proven ability to propose to his attractive honey blond wife, Jackie. My congratulations, David. You should run for President!

Some manufacturers did not seem so pleased with sales activities. But you cannot blame Wespercom's promotion and advertising that is known for a fact to have been extensive. Did the critics put in as much effort notifying their client lists or adding Portland Booth numbers to their advertising.

Evelyn Kessler told me that next year's Show may well move to Tahoe, which would be a better Western center in certain ways. Portland, Oregon takes some beating. "Oregon my Oregon". So the song goes. My middle name is John, so there is a little bias, with a town, river and dam of the same.

Just one **very** minor word of criticism - that "Just a Word or Two" in the Portland Program is very much the same as written by Rick Schnerringer in the STTI Trade Show Programs - almost identical. There were also a number of typographical errors in the program ... 'Jay' Howard is for the birds! He does prefer H. Taylor Howard. Despite that Evelyn, and you too Cliff, you ran a 'Great Little Show' with all the quality and longevity of that 'Great Little Receiver' - no prizes to readers who guess the manufacturer.

1983 Western Show Ratings:-

#1 STTI Las Vegas - size helps.
#2 Wespercom's Portland - a worthy runner up.
#3 Sat Expo Denver - no comment.

★ ★ ★

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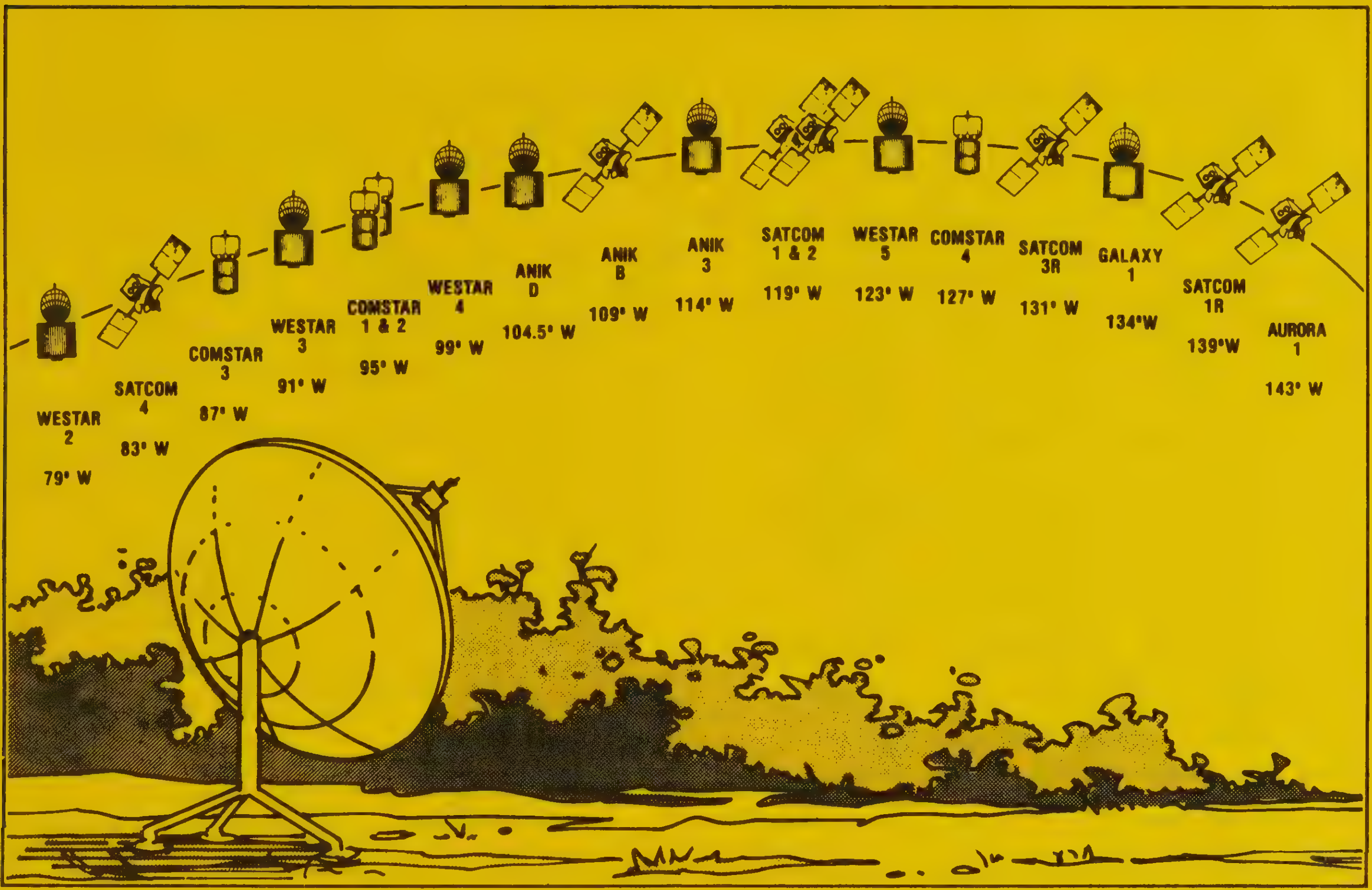
Existing & Future Satellites And Their Positions

Satellite	Position	Frequency (GHz)	Future Launch Date
SATCOM 2R	67°	6/4	1983
SPACENET II	69°	6/4 & 14/12	1984
SATCOM	72°	6/4	1984
GALAXY II	74°	6/4	1984
TELSTAR	76°	6/4	1984
RCA (Unnamed)	77°	14/12	1985
ADV. WESTAR	79°	6/4 & 14/12	1983
WESTAR 1/2	79°	6/4	
RSI	79°	14/12	1986
ASC	81°	6/4 & 14/12	1985
ABC I	83°	14/12	1986
SATCOM IV	83.5°	6/4	
USAT	85°	14/12	1984
WESTAR	86°	6/4	1984
COMSTAR D-3	87°	6/4	
TELSTAR 302	88.5°	6/4	To replace Comstar D-3
RCA	87°	14/12	1985
WESTAR 3	91°	6/4	
ADV. WESTAR	91°	6/4 & 14/12	?
SBS IV	89°	14/12	1984
SPACENET III	91°	6/4 & 14/12	1985
GALAXY III	93.5°	6/4	1984
SBS 3	95°	14/12	
COMSTAR D1/D2	95°	6/4	
TELSTAR 301	95°	6/4	To replace Comstar D1/D2
SBS II	97°	14/12	
WESTAR IV	98.5°	6/4	
SBS I	99°	14/12	
G-STAR 1	103°	14/12	1984
ANIK A-1	104.5°	6/4	
G-STAR 2	105°	14/12	1984
ANIK D-1	104.5°	6/4	
CANADA	107.5°	14/12	?
CANADA	108°	6/4	?
ANIK B	109°	6/4 & 14/12	
CANADA	110°	14/12	1985
CANADA	111.5°	6/4	?
CANADA	112.5°	14/12	?
ANIK A3/A2	114°	6/4	
ANIK D2	114°	6/4	
MEXICO	113.5°	6/4 & 14/12	?
MEXICO	116.5°	6/4 & 14/12	?
ANIK C3	117.5°	14/12	
SATCOM I	119°	6/4	
WESTAR IV	119.5°	6/4	1985
USAT	120°	14/12	1984
SPACENET III	122°	6/4 & 14/12	1985
WESTAR 5	123°	6/4	
SBS V	124°	14/12	1986
COMSTAR D-4	127.5°	6/4	
TELSTAR 303	125°	6/4	To replace Comstar D-4
RCA	126°	14/12	?
ASC	120°	6/4 & 14/12	1986
ABC I	130°	14/12	1987
SATCOM III R	131°	6/4	
RSI	132°	14/12	1986
GALAXY I	134°	6/4	
SATCOM IR	139°	6/4	
AURORA 1	143°	6/4	

Italicized satellites are future launches.
Bold face satellites are already in orbit.


WESTAR 2
79° W
SATCOM 4
83° W
COMSTAR 3
87° W
WESTAR 3
91° W
COMSTAR 1 & 2
95° W
WESTAR 4
99° W
ANIK D
104.5° W
ANIK B
109° W
ANIK 3
114° W
SATCOM 1 & 2
119° W
WESTAR 5
123° W
COMSTAR 4
127° W
SATCOM 3R
131° W
GALAXY 1
134°W
SATCOM 1R
139°W
AURORA 1
143° W

Programming Guide

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Future Programming Services

Satellite (if known)	Service	Possible Date
Satcom 4	HBO	
Westar 5	Rock 24	
Spacenet	ACTS Satellite Network	84
	Midwest Radio & TV	84
	The Pop Network	84
	SPN Programs	84
Unknown	The Pleasure Channel	unknown
	Super Sports Network	Fall
	C.E.N.T.S.	Fall
	Kid Vid Network	84
	The Channel Black	84

WESTAR 2 (79°) W) WESTERN UNION

TR	Programming	Time (EST)
3 (H)	Sports, News and Network feeds	Occasional
11 (H)	Sports, News and Network feeds	Occasional
19 (H)	Sports, News and Network feeds	Occasional

SATCOM F4 (83° W) RCA

TR	Programming	Time (EST)
1 (V)	**SIN** (National Spanish Television Network) Ethnic	Daily, 24 Hours
2 (H)	**FNN** (Financial News Network) Business News	Mon-Fri, 7am-7pm
	BRAVO - cultural	8 pm - 6 am daily
3 (V)	**SPN** (Satellite Program Network) Variety Entertainment	Daily, 24 Hours
4 (H)	**HOME SPORTS ENTERTAINMENT** Sports	6:30 pm-1am daily
5 (V)	**ABC** West Coast Programming	Occasional
6 (H)	**ESPN** Sports Feed	Occasional
7 (V)	**NCN** (National Christian Network) Religious	Daily, 24 hours
11 (V)	**HOME SPORTS ENTERTAINMENT**	6:30pm-1am daily
12 (H)	**THE PLAYBOY CHANNEL** Adult Entertainment	8pm-6am daily
15 (V)	**BIZNET** (The American Business Network) Business News	Mon-Fri 8am-2pm
17 (V)	**TBN** (Trinity Broadcasting Network) - Religious	Daily, 24 Hours
19 (V)	**THE AMERICAN NETWORK** - Movies	5pm-5am daily
22 (H)	**ABC** West Coast Programming	Occasional
23 (V)	**GALAVISION** Ethnic Spanish Language Programming	Sat-Sun 24 Hours Mon-Fri 4pm-4am
24 (H)	**NBC** Network Feeds	Occasional

Audio Subcarrier Services on Satcom 4

TR	Program	Subcarrier
3	**RHYTHM & BLUES** - Contemporary jazz/soul music (discrete stereo)	5.4 & 6.3
	NATIONALITY BROADCASTING NETWORK - Multilingual music, news, sports	6.435
	ROCK -A- ROBICS - top 40 Rock (discrete stereo)	7.38 & 7.56
	GEORGIA STATE RADIO NETWORK	7.695
7	**JOY RADIO** - contemporary religious	5.4
	FAMILY RADIO NETWORK (East) (discrete stereo)	5.58 & 5.76
	FAMILY RADIO NETWORK (West) (discrete stereo)	5.94 & 6.12
	ASTRO RADIO NETWORK religous talk and music	6.3
	SHERIDAN BROADCASTING NETWORK - (discrete stereo)	7.38 & 7.56
	BLUE SUEDE RADIO NETWORK - 50's and 60's classics	7.74
	GOLD MINE RADIO NETWORK - country & western	7.92
17	**SATELLITE JAZZ NETWORK** - contemporary/traditional jazz (discrete stereo)	5.58 & 5.76

COMSTAR D3 (87° W) AT&T

TR	Programming	Time (EST)
1 (V)	**SATELLITE TELEVISION SERVICE** (NBC) - Network Feeds	Occasional
4 (H)	**TRANSGLOBAL GALACTICA** - Network feeds, news, sports	Occasional
8 (H)	**ABC TELEVISION NETWORK** - network feeds	Occasional
10 (H)	**CBS TELEVISION NETWORK** - network feeds	Occasional
13 (V)	**CBS TELEVISION NETWORK** network feeds	CST feeds
17 (V)	**CBS TELEVISION NETWORK** - network feeds	CST feeds

WESTAR 3 (91° W) WESTERN UNION

TR	Programming	Time (EST)
5 (H)	**CNN** (Cable News Network)	Occasional
19 (H)	**HUGHES TELEVISION NETWORK** - Sports	Occasional
21 (H)	Network Feeds, News, Sports	Occasional
	INDEPENDENT NETWORK NEWS	Occasional
23 (H)	Network feeds, News, Sports	Occasional
	HSC-TV/The Bame Hour	Occasional

COMSTAR D1/D2 (95° W) AT&T

(occasional transmissions - sporting events, teleconferencing, news and network feeds on transponders 1-4-9-11-12-14-20-22-24)

WESTAR 4 (99° W) WESTERN UNION

TR	Programming	Time (EST)
2 (V)	**HUGHES TELEVISION NETWORK**	Occasional
4 (V)	**HUGHES TELEVISION NETWORK**	Occasional
6 (V)	**XEW-TV**, Mexico City	Occasional
9 (H)	**ROBERT WOLD COMMUNICATIONS**	Occasional
11 (H)	**CTNA** (Catholic Telecommunications Network of America)	Occasional
15 (H)	**PUBLIC BROADCASTING SYSTEM**	Daily
16 (V)	**CNN**	Occasional
17 (H)	**PUBLIC BROADCASTING SYSTEM**	Daily
20 (V)	**ABC** Network Contract Channel - live/taped network feeds	Occasional
21 (H)	**PUBLIC BROADCASTING SYSTEM**	Daily
23 (H)	**PUBLIC BROADCASTING SYSTEM**	Daily

ANIK D1 (104° W) TELESAT

TR	Programming	Time (EST)
8 (V)	**CHCH-TV** variety programming from Ontario's leading independent station.	Daily (Scrambled)
14 (V)	**TCTV** (Telemedia Communications Network) Variety Programming	Daily (Scrambled)
16 (V)	**CBC PARLIAMENTARY NETWORK** (English) Live coverage of the House of Commons from Ottowa and variety programming	Daily
18 (V)	**CITV-TV** - Alberta's Leading Station - Variety Programming	Daily (Scrambled)
22 (V)	**BCTV** (British Columbia Television) Variety Programming from British Columbia	Daily (Scrambled)
24 (V)	**CBC PARLIAMENTARY NETWORK** (French) - variety programming	Daily

Audio Subcarrier Services on Anik D1

TR	Programming	Subcarrier
8	**CKO-FM** Torronto, Ontario - All news and information radio	6.17
14	**CKAC-AM**, Montreal, Quebec French language station	5.41
	CITE-FM, Montreal, Quebec French language station	6.17

18	**CKRW-AM,** Whitehorse Yukon "Voice of the North"	5.41
	CIRK-FM, Edmonton, Alberta progressive rock, (mpx stereo)	6.17
22	**CFMI-FM,** New Westminister B.C. - soft rock, (mono)	6.17
23	**CFQM-FM,** Moncton, New Brunswick - Uptown Country Music (mono)	5.41
23	**VOCM,** St. John's Newfoundland - adult comtemporary music (mono)	6.17

ANIK B (109° W) TELESAT

TR	Programming	Time (EST)
7 (H)	Network feeds, Sports and News	Occasional
11 (H)	**CBC NORTH** Variety Programming (Pacific Time Zone)	daily
13 (H)	Network feeds, Sports and News	Occasional
15 (H)	**CBC** (French) - Variety Programming	daily
17 (H)	**CBC**	Occasional
19 (H)	**CBC NORTH** - Variety Programming (Atlantic Time Zone)	daily

SATCOM F1 (119°W) RCA

TR	Programming	Time (EST)
1 (V)	**ROBERT WOLD COMMUNICATIONS** - Sports, News, Network feeds	Occasional
3 (V)	Network feeds, Sports & News	Occasional
12 (H)	**NBC** - network feeds	Occasional
24 (H)	Network feeds, Sports & News	Occasional

WESTAR 5 (123°W) WESTERN UNION

TR	Programming	Time (EST)
1 (H)	**THE BLUEMAX THEATER CHANNEL** - X Rated Adult Programming	Thurs-Sat Midnite-6am (Scrambled)
2 (V)	**CBS TELEVISION NETWORK,** network feeds	Occasional
3 (H)	**WOR-TV** (New York Channel 9) independent	daily, 24 Hours
5 (H)	**SELEC-TV** - Movies, Specials	daily, 24 Hours
7 (H)	**CBS TELEVISION NETWORK,** network feeds	Occasional
8 (V)	**SATELLITE NEWS CHANNEL** News, National, International	daily, 24 Hours
10 (V)	**THE DISNEY CHANNEL (WEST)** family entertainment	daily 7am-11pm
11 (H)	**SATELLITE NEWS CHANNEL** Same as transponder 8	daily, 24 Hours
12 (V)	**THE DISNEY CHANNEL (EAST)** Same as transponder 10	daily, 24 Hours
14 (V)	**SATELLITE NEWS CHANNEL** Same as transponder 8	daily, 24 Hours
16 (V)	**SATELLITE NEWS CHANNEL** Same as transponder 8	daily, 24 Hours
17 (H)	**THE NASHVILLE NETWORK** country orientated entertainment	daily 9am-3am
18 (V)	**SATELLITE NEWS CHANNEL** Same as transponder 8	daily, 24 Hours
21 (H)	**SPOTLIGHT** Movies only	daily 24 hours
23 (H)	**DAYTIME** Programming for women	daily 1pm-9pm
23 (H)	**HEARST/ABC ARTS** (Alpha Repertory Television Service)	daily 9pm-midnight
24 (V)	**BET** (Black Entertainment Television) - Ethnic	daily 8pm-2am

Audio Subcarrier Services on Westar 5

TR	Programming	Subcarrier
17	**THE NASHVILLE NETWORK** (Stereo)	5.58 & 5.76
23	**ARTS** (stereo)	5.58 & 5.78
24	**BET** (stereo)	5.58 & 5.78

COMSTAR D4 (127°W) AT&T

TR	Programming	Time (EST)
8 (H)	**ON-TV-** Scrambled (movies)	daily 24 hours
11 (V)	**ON-TV-** Scrambled (movies)	daily 24 hours
13 (V)	**ESPN** - sports	Occasional
16 (H)	Network feeds, sports and news	Occasional
18 (H)	**THE COUNTRY MUSIC SATELLITE NETWORK (CMTV)**	daily

Audio Subcarrier Services on Comstar D4

TR	Programming	Subcarrier
18	**COUNTRY MUSIC TELEVISION** (stereo)	5.58 & 5.78

SATCOM F3 (131°W) RCA

TR	Programming	Time (EST)
1 (V)	**NICKELODEON** - Children's Programming	Daily 8am-9pm
	ARTS -Cultural Programming	Daily 9pm-midnight
2 (H)	**PTL** - Religious Programming	Daily 24 Hours
3 (V)	**WGN** - Independent programming from WGN-TV Chicago	Daily 24 Hours
4 (H)	**SPOTLIGHT** - Movies	Daily 24 Hours
5 (V)	**THE MOVIE CHANNEL**	Daily 24 Hours
6 (H)	**WTBS** - Independent Sports, News Movies	Daily 24 Hours
7 (V)	**ESPN** - Sports	Daily 24 Hours
8 (H)	**CBN** - Family orientated Programming	Daily 24 Hours
9 (V)	**USA CABLE NETWORK** Varied Programming	Daily 24 Hours
10 (H)	**SHOWTIME (WEST)** Movies and Specials	Daily 24 Hours
11 (V)	**MTV** - Music Television (stereo)	Daily 24 Hours
12 (H)	**SHOWTIME (EAST)** Movies and Specials	Daily 24 Hours
13 (V)	**HBO (WEST)** - Movies and Specials	Daily 24 Hours
14 (H)	**CNN** (Cable News Network) - Round the Clock News	Daily 24 Hours
15 (V)	**CNN HEADLINE NEWS** Compact Headliners	Daily 24 Hours
16 (H)	**HTN PLUS** - family orientated movies and specials	Daily 4pm-4am
	ACSN- the learning channel - educational	Mon-Fri 6am-4pm Sat-Sun 6am-1pm
	NJT (National Jewish Television) - Religious	Sun 1pm-4pm
17 (V)	**CABLE HEALTH NETWORK** - Health and Science	Daily 24 Hours
18 (H)	**THE ALTERNATE VIEW NETWORK** - Religious	Sun 8am-1pm
	ETERNAL WORD TELEVISION NETWORK Religious	Daily 8pm-12pm
	REUTER NEWS SERVICE (Scrambled)	Mon-Fri 4am-8pm
19 (V)	**C-SPAN** - Public Affairs	Daily 24 Hours
20 (H)	**CINEMAX (EAST)** Movies	Daily 24 Hours
21 (V)	**THE WEATHER CHANNEL** Weather	Daily 24 Hours
22 (H)	**MSN** -the information channel - Consumer Information	Mon-Fri 10am-1pm
	USA BLACKOUT NETWORK occasional video after 5pm	
	DAYTIME - programming for women	Mon-Fri 1pm-5pm
23 (V)	**CINEMAX (WEST)** Movies only	Daily 24 Hours
24 (H)	**HBO (EAST)** - Movies	Daily 24 Hours

Audio Subcarrier Services on Satcom F3R

TR	Programming	Subcarrier
2	**SATELLITE RADIO NETWORK** - contemporary/religious	6.2
3	**MOODY BROADCASTING NETWORK** - religious (discrete stereo)	5.4 & 7.92
	SATELLITE MUSIC NETWORK - adult contemporary (discrete stereo)	5.58 & 5.76
	SATELLITE MUSIC NETWORK - country coast-to-coast (discrete stereo)	5.94 & 6.12
	WFMT (FM) CHICAGO - arts/classical (discrete stereo)	6.3 & 6.48
	BONNEVILLE'S "BEAUTIFUL MUSIC" -(stereo)	7.38 & 7.56
6	**MUSIC IN THE AIR** - country/western (discrete stereo)	5.4 & 5.94
	broadway/hollywood (discrete stereo)	5.58 & 5.76
	50's & 60's (mono)	6.435
	comedy/specials (mono)	7.695
7	**ESPN** - program schedule information	6.2
8	**CABLE JAZZ NETWORK**, - jazz (discrete stereo)	5.94 & 6.12
14	**CNN RADIO NETWORK** - all news radio feed	6.3

GALAXY 1 (134° W) Hughes Communications, Inc.

TR	Programming	Time (EST)
1 (H)	**HBO**	(to be announced)
2 (V)	**Group W/Westinghouse** Broadcasting	
3 (H)	**HBO**	
4 (V)	Reserve	
5 (H)	**Times-Mirror**	
6 (V)	**SIN** (Spanish International Network)	
7 (H)	**Turner Broadcasting**	
8 (V)	**Group W/Westinghouse Broadcasting**	
9 (H)	Reserve	
10 (V)	**Times-Mirror**	
11 (H)	**Reserve**	
12 (V)	**Group W/Westinghouse Broadcasting**	
13 (H)	Reserve	
14 (V)	**Viacom International**	
15 (H)	**SIN** (Spanish International Network)	
16 (V)	**Viacom International**	
17 (H)	**HBO**	
18 (V)	**Turner Broadcasting**	
19 (H)	**HBO**	
20 (V)	**SIN** (Spanish International Network)	
21 (H)	**HBO**	
22 (V)	**Group W/ Westinghouse Broadcasting**	
23 (H)	**HBO**	
24 (V)	Reserve	

also C-SPAN (Cable Satellite Public Affairs) transponder to be announced.

SATCOM 1 R (139° W) RCA

TR		Programming	Time (EST)
1	(V)	ROBERT WOLD COMMUNICATIONS	Occasional
3	(V)	Sports, News, & Network Feeds	Occasional
8	(H)	INTERNATIONAL TELEVISION Domsat/Intelsat link channel	Occasional
13	(V)	NASA CONTRACT CHANNEL - live NASA missions and mission-related event coverage	Operated only during ongoing missions
20	(H)	ARMED FORCES SATELLITE NETWORK & Independent programming	Occasional
22	(H)	HI-NET COMMUNICATIONS - Network videoconferencing	Occasional

Audio Subcarrier Services on Satcom 1 R

TR	Programming	Subcarrier
12	NBC RADIO NETWORK	4.2
	(pacific)	
	(central/mountain)	4.6
	(Eastern)	5.0
	"THE SOURCE"	5.8/5.4
	TALK-NET	5.8

AURORA (143° W) ALASCOM (SATCOM 5)

TR		Programming	Time (EST)
19	(V)	network feeds, news & sports	Occasional
20	(H)	LEARN/ALASKA TELEVISION NETWORK	Occasional
21	(V)	network feeds, news & sports	Occasional
24	(H)	ALASKA SATELLITE TELEVISION PROJECT - network & independent programming	Occasional

PROGRAMMING NEWS

Country Music Television. Warner Amex Satellite Entertainment Co. apparently felt the CMTV trademark was too close to their MTV trademark, so they filed suit against Country Music Television.

WASEC had asked the court to enjoin the CMTV - venture parties from using CMTV or MTV in "any manner or form." The suit has been settled out of court by Country Music Television, agreeing not to use the initials "CMTV" in advertising and promotional pieces, instead using the full name of the service "Country Music Television". Although the defendants felt the suit was without merit, a spokesman for CMTV stated they decided it wasn't worth the effort to pursue the case in the courts.

NICKELODEON. Nickelodeon, the first channel for kids has been awarded the Peabody Award for Excellence. The George Foster Peabody Award has been called the "Pulitzer Prize" of the electronic media, and has been awarded to such outstanding shows as "M.A.S.H.", "60 Minutes" and "Hill Street Blues". This award marks a change in tradition for the Peabody Board in that this is the first time it has been awarded to an entire television channel.

This award comes at a time in which children's television is generally seen to be in decline, so the Peabody Board's selection of a channel devoted to children is particularly noteworthy. Nickelodeon is on Satcom F3, transponder 1.

SPN Launches The MusicChannel. Satellite Program Network, Inc. (SPN) and MusicChannel, Inc. are combined in a joint venture to provide cable television systems and broadcast stations with a video music program service.

The MusicChannel features adult contemporary music videos, with styles ranging from light rock, soul, and country to urban contemporary music. In addition, the MusicChannel will include artist interviews, concert information, concert footage and entertainment news. Video disc jockeys will add continuity.

Artists such as Diana Ross, Kenny Rogers, Earth, Wind & Fire, Al Jarreau and Crystal Gayle appeal to many viewers who cannot see those artists on other services.

SPN Adds Children's Program. "The Country Kids Show". A "first" for Satellite Program Network, Inc. (SPN) will be the introduction of "The Country Kids Show" in September.

A lively group of talented kids ages five to teenage will sing and dance their way into your heart. "The Country Kids Show" showcases new talent, rising young singers and pint-sized comedians in a fast-moving format similar to the "Hee-Haw" country program.

Watch for five-year-old Miss "Polly Darton," singing sensation, and the back hills cloggers. "The Country Kids Show" will begin at 10 a.m. each Saturday morning in September.

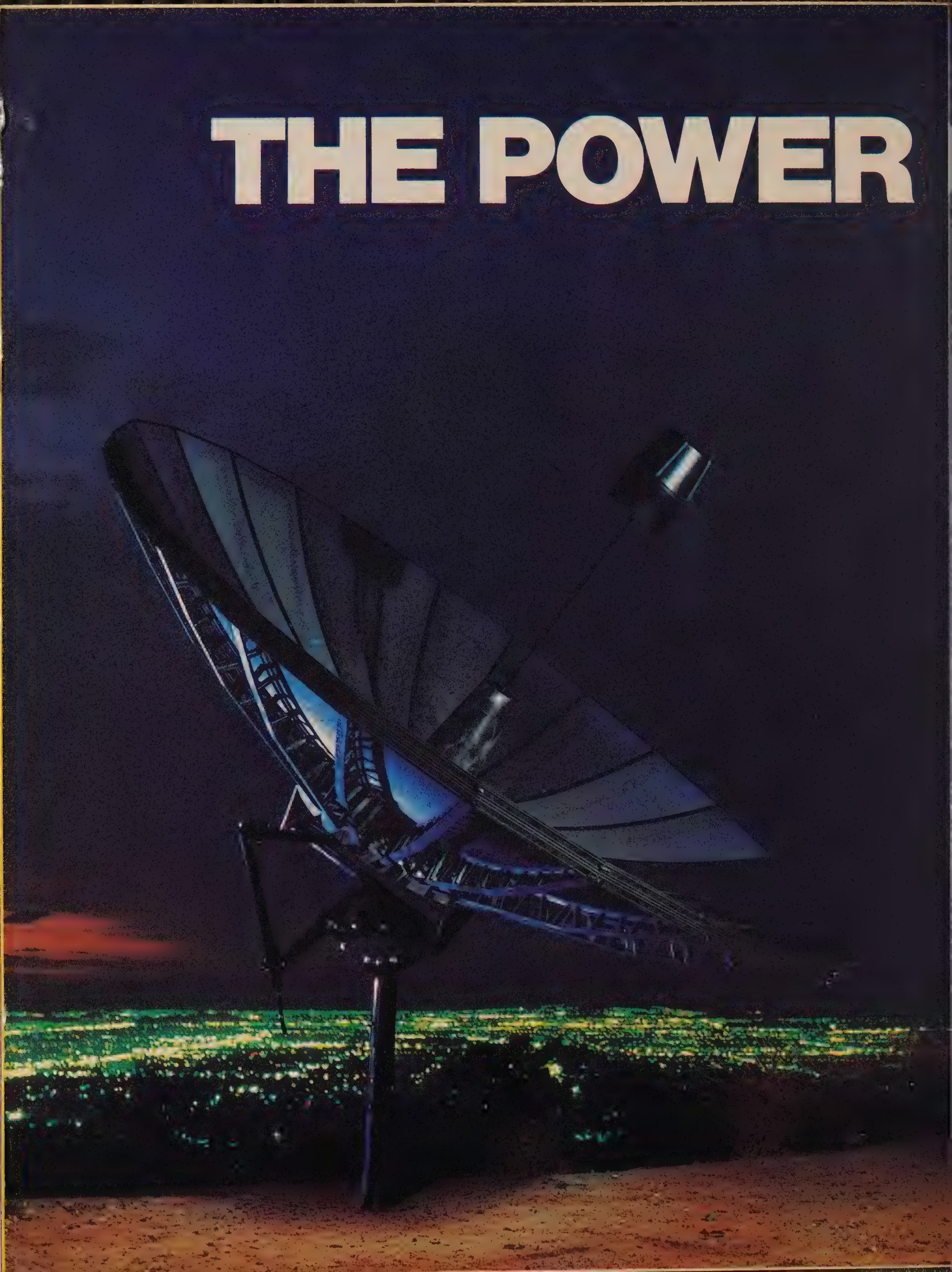
SPN is a 24-hour cable service located on Satcom IV, transponder 3. SPN provides international, financial and special programs, plus all-night films.

The Disney Channel Sets Fall Schedule. Burbank: The Disney Channel unveiled its fall and winter program schedule. James P. Jimirro, president of the family-oriented channel, revealed that four exclusive series, an afternoon cartoon show, docu-dramas and sports specials will, starting on September 1, be added to the outstanding line-up of feature films to be seen on the Disney Channel.

Jimirro said that several changes were made in the scheduling of certain programs in response to extensive subscriber research conducted among current subscribers to the Channel.

★ ★ ★

THE POWER



OF DARKNESS

Now one dish
eclipses all the rest.
Janeil's new Dark Star.™
Its revolutionary design
is a state-of-the-art triumph
leaving other dish manufacturers
in a state of shock.
For you, the Dark Star's combination
of quality, technology and price
is power on a cosmic scale.
This is the first satellite dish constructed
of high-tech, weatherproof plastics and
polycoated aluminum screen.
Shipping is lightweight. Assembly and
installation is supernaturally easy. Reception is laser
sharp with injection molded durability and accuracy.
And its appearance outshines
everything. Your choice of 10′ or 12′.
Janeil's new Dark Star.™
The power is yours.

DARK STAR™ BY JANEIL

Arizona, Hi Frontier, 2230 East Indian School Road, Phoenix, AZ 85106 (800) 382-0395; **California,** Echosphere, 5671 Warehouse Way, Sacramento, CA 95826 (800) 338-5478; **Colorado,** Echosphere, 2250 South Raritan #A, Englewood, CO 80110 (800) 521-9282; **Montana,** A.V. Electronics Marketing, 4301 North Star Blvd., Great Falls, MT 59401 (800) 332-9934; **New York,** National Satellite Communications, Plaza 7, Latham NY 12110 (800) 833-4485; **Oregon,** Total Television, Inc., 17537 N. Umpqua Highway, Roseburg, Oregon 97470 (503) 496-3583; **South Carolina,** Quarles Electric Supply, Inc., 1616 Calhoun Rd., Greenwood, SC 29646 (800) 922-9704 (SC) (800) 845-6952 (National); **Tennessee,** Lewis Electronics, P.O. Box 100, West Elm St., Humbolt, TN 38343 (901) 784-2191; **Texas,** Star Com, 2205 W. Division #C6, Arlington, TX 76012 (800) 592-1476 (TX) (800) 351-1426 (National); Star Com, 511 Gregg St., Big Springs, TX 79720 (800) 592-1476 (TX) (800) 351-1426 (National); **Washington,** Hi Frontier, 976 Industry Drive, Seattle, WA 98188 (800) 424-4011; **Canada,** C.S.E. Satellite Equipment Inc., P.O. Box 1060, Brownsburg, Que. JOV 1A0 (514) 533-5470; C.A.L.E. Communications Inc., 693 Henderson Drive, Regina, Sask., Canada S4N 6A8 (306) 949-9181

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NOW YOUR DEEP DISH CAN BE AS GOOD AS GOLD.

If you've got a system with a deep dish*, we've got an accessory that'll improve it. It's our one ounce snap-in gold ring. And believe it or not, it even improves the performance of new or existing Chaparral Polarotor's™ or Feedhorns. How? Very simply. It properly illuminates your deep dish and in the meantime helps it maintain a low noise temperature.

This increases the carrier to noise ratio by .9 db. That's the equivalent of replacing a 120° LNA with one that's 100°.

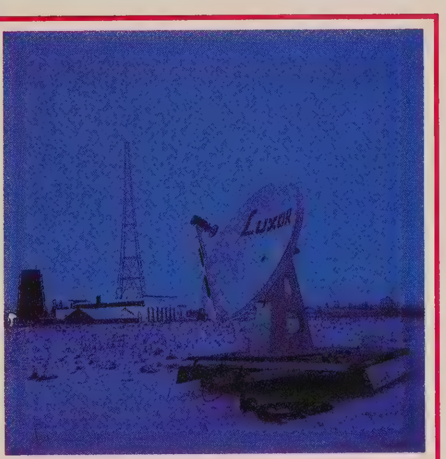
If your dish is the perfect match for our newest accessory, call us. We'll give you the name of our nearest distributor. And performance that's solid gold.

Chaparral. Our focus is on the future.

CHAPARRAL

Chaparral Communications, Inc. 2343 Bering Dr., San Jose, CA 95131 (408) 262-2536

*This accessory works only on a true parabolic dish with an f/d ratio of .32 or lower.



LUXOR

Satellite Television Electronics

Precision Quality from Sweden.

The Whole Story:

It started in 1923, when Luxor began manufacturing radios in a small plant in Motala, Sweden. From our 3-tube, battery-operated radio through the development of our infrared remote control satellite receiver, we've learned a lot these past 60 years. And we've contributed significantly to the electronics revolution in a number of industries.

Aerospace. Personal computers. Automotive. Transportation. And more. With worldwide distribution and 20 acres of electronic laboratories and production facilities in Sweden, we're committed to being on the cutting edge of today's electronics revolution.

Technology Ahead of its Time.

For the exclusive high-performance Maserati, Luxor designed a high-powered controller that adjusts the engine for any grade fuel, any octane rating, automatically.

We've also designed shoplifting prevention systems that are virtually false-alarm proof. Totally distortion-free loudspeakers for Volvos. Even fuel efficiency systems for the Saab Turbo.

In the field of satellite electronics, we've developed a receiver regarded by experts as the standard of the industry since its 1982 introduction to the United States. With its advanced technology and precision-tuned reception, this receiver has already become the market leader. It's no wonder Luxor has become the first word in comsumer electronics. For the very best of reasons. Quality.

The Luxor Receiver. Where Simplicity Functions Beautifully.

Now satellite technology comes home with simplicity that's simply beautiful. That's because we engineered all our receivers to give you the latest technology with the least amount of trouble.

You'll find controls right on the front panel, so they're simple to read and easy to reach. Component and accessory hook-ups are simple to set up. In fact, the only thing about the Luxor you won't find simple may be deciding which model you like best.

That's because our 9533 has all the features and proven performance you're looking for in a receiver, while our 9550 has all the same outstanding features — and then some. Including a host of accessory options to expand your viewing pleasure even more.

LUXOR

60 Years of Uncompromising Quality.

After more than 60 years of quality control, research and development, only we at Luxor can make our kind of exceptional commitment to the reliability of our product.

That's why we offer a complete, full-year warranty on all parts and labor, guaranteed. And all Luxor distributors are factory-trained and fully stocked with authorized repair and replacement parts. That means you can get fast, 48-hour service from almost anywhere.

What's more, every Luxor satellite receiver is specially designed for years and years of picture-perfect performance, maintenance-free. We even put every unit of every model through 24 hour "burn-in" testing, ensuring the very highest in quality.

Whatever Luxor receiver you choose, be confident you're buying the best receiver you can find today. Most probably tomorrow.

Luxor has been around for 60 years, so you don't have to worry if we'll be here next week when you need us. That's important in an industry where new companies are here one day and gone the next. So when you buy a satellite receiver, think about the company behind it. Down the road, you'll be glad you did.

Luxor. 60 years of uncompromising quality. It will mean a lot to you.

The Standard Worldwide

Luxor 9533

All You Need For The Finest Reception.

Luxor 9533

The 9533 is a total system that gives you everything you need to open your home to the world of satellite television. A built-in Chaparral Polarotor control and modulator, so there's no need for external rotor controls or modulator boxes. Smart styling, brushed aluminum housing, and signal strength LED display for the look of the future. Low threshold for excellent video performance. Stereo matrix and direct systems with narrow and wide band deviation are standard, as well as scan, video invert and defeatable AFC.

It all adds up to reliable, trouble-free, top-quality satellite reception. That's what the 9533 delivers hour after hour, day after day. And it does it all, at a surprisingly low cost. You simply can't find a better buy than the Luxor 9533.

Luxor 9550

The Ultimate in Satellite Reception.

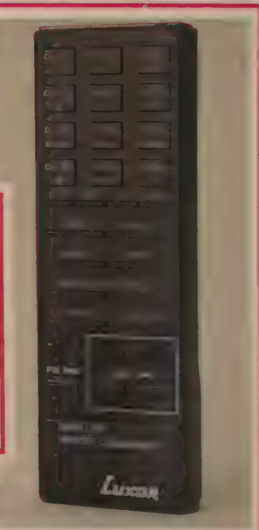
For the most selective satellite television viewer, Luxor presents the 9550. High-performance video and stereo audio reception with precision dependability and the ultimate in features and accessories. Luxor has it all!

Built-in Chaparral Polarotor control and modulator for vertical and horizontal polarization, automatically. Signal strength LED display. Stereo matrix and direct systems with narrow and wide band deviation. Scan, video invert and defeatable AFC. Low threshold for video excellence. Plus Dolby dynamic noise reduction and a 2:1 audio expander. Nothing else on the market comes close. Not in quality. Not in price.

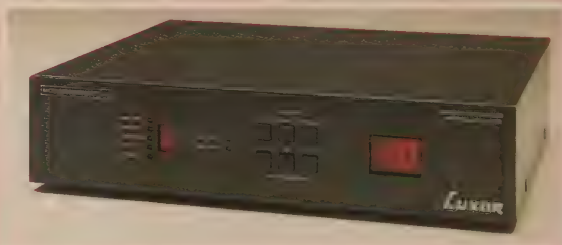
Remote Possibilities Beyond Imagination.

Luxor accessories add even more to the 9550 to help you get the most out of satellite television. Our actuator control lets you change positions on your satellite dish without leaving your house. And with our hand-held remote control unit you have instant access to any receiver or actuator function, plus all 24 transponder channels — right from your easy chair.

Even better, the 9536 sensor gives you direct access to all those same remote control functions from any room in your house. We call it remote remote control. You'll call it remarkable.



Luxor 9541 Remote Control controls virtually all functions with hand-held convenience. For the 9550.



Luxor 9534 Actuator interfaces with the 9550 for accurate and precision antenna location by remote control.

Luxor 9550

Luxor 9536 Sensor accesses 9550 receiver and 9534 actuator from any room in your home.

[illegible]

Input frequency: 70 MHz
Input level: -45 to -5 dBm
Input impedance: 75 ohm
Input connector: Type F
Tuning system: Digital voltage synthesizer with nonvolatile memory
Programmable channels: 24 + 8
Tuning voltage output: 1-30 V on RF input line
LNA power output: +18 V
Scan: Included
IF bandwidth (3 dB): 26 MHz min.
Video deemphasis characteristic: CCIR Rec. 405-1, curve A
Video polarity: Positive or negative
Video output level (at 10.74 MHz peak dev.): 1 Vpp
Video output connector: Type F (75 ohm)
FM threshold (C/N 30 MHz): <8 dB
Video S/N at 14 dB C/N: 50 dB (weighted)
EDS rejection: 40 dB
Audio systems:
Mono 1 (6.8 MHz/tunable)
Mono 2 (6.2 MHz/tunable)
Stereo direct
Stereo matrix
Audio tuning: Preprogrammed or tunable
Audio tuning range: 5-8 MHz
Audio output level in "narrow" mode: (75 KHz dev.) 0 dBm (600 ohm)
Audio output level in "wide" mode: (75 kHz + 10 dB dev.) 0 dBm (600 ohm)
Audio output connectors:
Stereo phono plugs (left and right)
Mono F-connector
AC power input: 117 V, 60 Hz
Size (L × W × H): 280 × 270 × 100 mm (10" × 10-5/8" × 4")
Weight: Approx. 3.8 kg (8.4 pounds)

SATELLITE RECEIVER
Luxor

REMOTE CONTROLLED SATELLITE RECEIVER
24
Luxor

[illegible]

Input frequency: 70 MHz
Input level: -45 to -5 dBm
Input impedance: 75 ohm
Input connector: Type F
Tuning system: Digital voltage synthesizer with nonvolatile memory
Programmable channels: 24 + 8
Tuning voltage output: 1-30 V on RF input line
LNA power output: +18 V
Scan: Included
IF bandwidth (3 dB): 26 MHz min.
Video deemphasis characteristic: CCIR Rec. 405-1, curve A
Video polarity: Positive or negative
Video output level (at 10.74 MHz peak dev.): 1 Vpp
Video output connector: Type F (75 ohm)
FM threshold (C/N 30 MHz): <8 dB
Video S/N at 14 dB C/N: 50 dB (weighted)
EDS rejection: 40 dB
Audio systems:
Mono 1 (6.8 MHz/tunable)
Mono 2 (6.2 MHz/tunable)
Stereo direct
Stereo matrix
Audio tuning: Preprogrammed or tunable
Audio tuning range: 5-8 MHz
Audio output level in "narrow" mode: (75 KHz dev.) 0 dBm (600 ohm)
Audio output level in "wide" mode: (75 kHz + 10 dB dev.) 0 dBm (600 ohm)
Audio output connectors:
Stereo phono plugs (left and right)
Mono F-connector
AC power input: 117 V, 60 Hz
Size (L × W × H): 280 × 270 × 100 mm (10" × 10-5/8" × 4")
Weight: Approx. 3.8 kg (8.4 pounds)

The Luxor 9533 and 9550 are available exclusively at these United States distributors:

Allsat Inc.
Kansas City, Kansas
1-913-268-5151
Echosphere Corp.
Englewood, Colorado
1-800-521-9282
Echosphere West
Sacramento, California
1-800-338-5477 (out-of-state-western zone)
1-800-338-5478 (in-state)
High Frontier
Phoenix, Arizona
1-800-382-0395
High Frontier Northwest
Seattle, Washington
1-800-424-4011
1-206-575-0660
Hoosier Electronics
Terre Haute, Indiana
1-812-238-1456
Quarles Electronics
Greenwood, South Carolina
1-803-229-3638
Satcom USA
Palenville, New York
1-518-678-9322
Satellite Earth Stations
Mamou, Louisiana
1-800-762-2110 (out-of-state)
1-800-252-3307 (in-state)
Satellite Sales
Cleveland, Ohio
1-800-321-1188
Satellite TV Systems
Clemson, South Carolina
1-803-654-5569
Starcom
Big Springs, Texas
1-915-263-7512
TransVision Corporation
Greenbrae, California
1-415-924-6963
Warren Supply
Sioux Falls, South Dakota
1-605-336-1830
Southeast Satellite Distributors, Inc.
Saint Augustine, Florida
1-904-824-1915

All Luxor receivers have been type accepted by the Federal Communications Commission and comply with FCC rules, part 15 covering unauthorized interference.

All Luxor Distributors Are U.S. Factory Trained.

Luxor satellite television products are imported solely
by
STS
St. Louis, Missouri

ECLIPSE™

ANTENNA CONTROLS

Add The Finishing Touch To Any System

Whatever you desire in antenna controls TDF has it. WE offer the programmable ECLIPSE 1, CORONA UP-DOWN COUNTER, MANUAL E2, and now the infra red remote control ECLIPSE *ir*. TDF Corporation also offers motor drive units in long stroke, short stroke and retrofit configurations.

To complete your system, contact us or ask your dealer about the "ECLIPSE" antenna controls.

ECLIPSE ir
1022

ECLIPSE *ir*
infra red
remote

ECLIPSE 1
Programmable Antenna Control

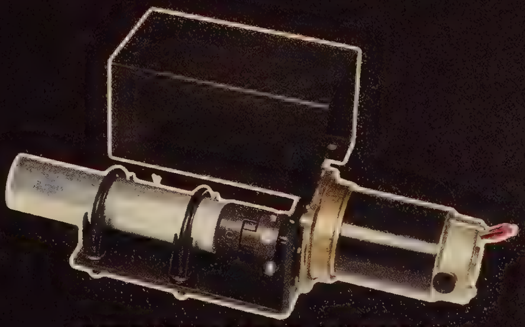
ECLIPSE 1

TDF CORPORATION
CORONA

CORONA ECLIPSE

E2

POWER DRIVE UNIT



RETROFIT MOTOR ASSEMBLY

TDF
CORPORATION

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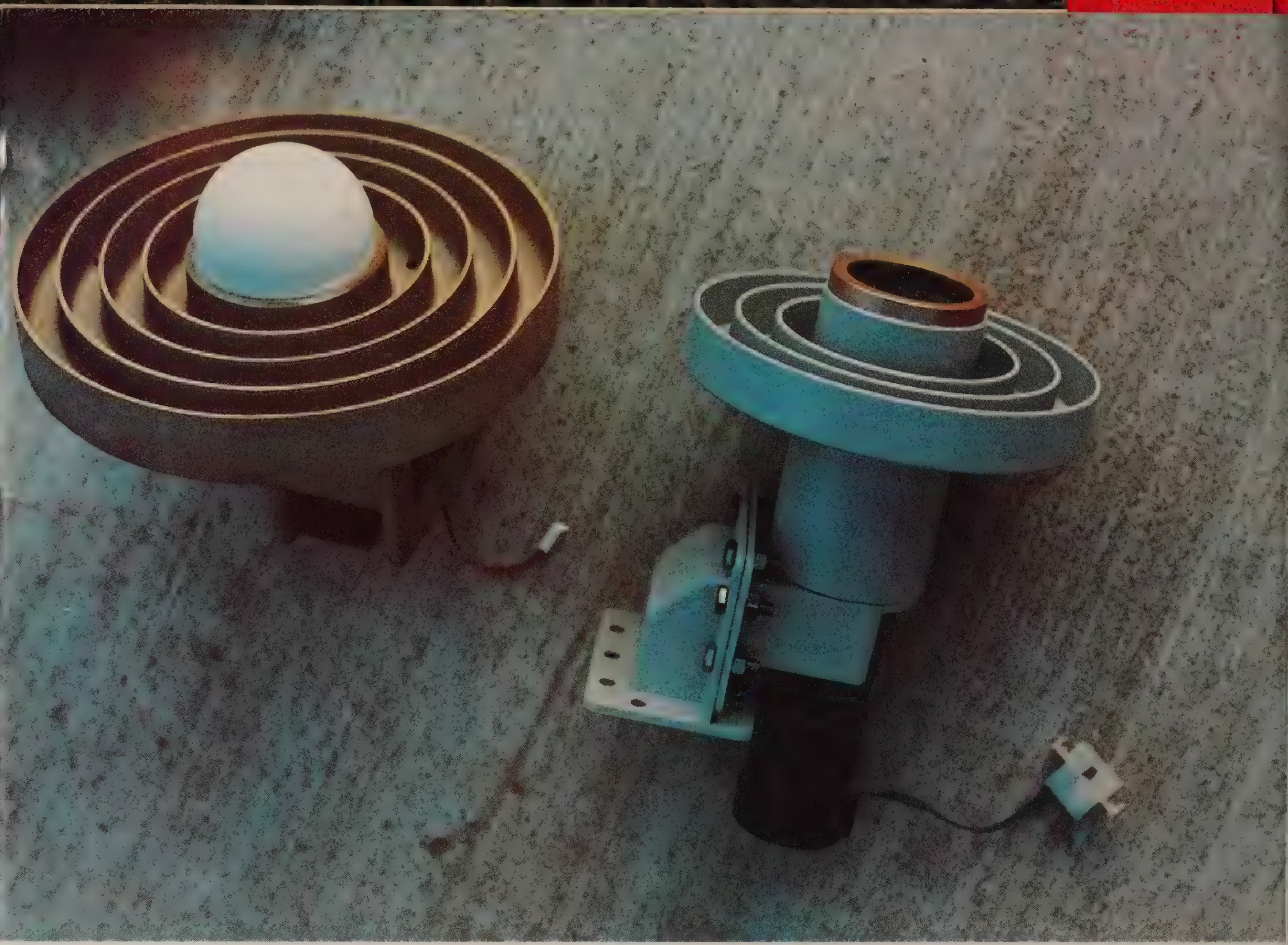


New Breed of Feeds for Deep Antennas. (.25 - .30 F/D)

New Feeds for Deep Dishes

By Mike L. Gustafson

Back in the days when this industry was only a gleam in the eyes of a few intrepid souls, the only antennas available were cast-off terrestrial communication antennas.

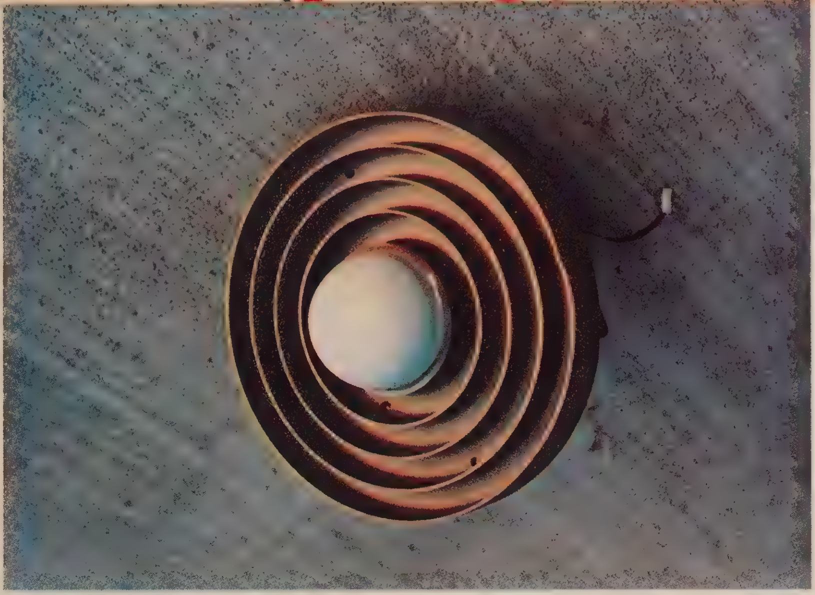
These antennas were deep antennas or low F/D antennas. This meant that most of the antennas had a Focal point divided by Diameter, F/D, of .25 to .30. To compute F/D all you have to do is find the focal point and divide it by the diameter of the antenna. One of my antennas has a focal point of 36 inches and a diameter of 10 feet. 36 inches is the same as 3.0 feet so if we divide 3.0 by 10.0, we get a F/D=. 0.3 F/D is just a simple way of conveying to anyone else, in a general way, what type of antenna you have.

So, with the availability of only .3 antennas, the early experimeters used what they could find. As the industry grew, a few of the antenna manufacturers started using these surplus terrestrial antennas for molds to build satellite antennas. This process was quicker and cheaper than trying to design and build their own mold. They didn't realize what kind of antenna they were copying. Terrestrial communications links, like point to point microwave systems, operate over a very short distance from hill top to hill top. In an application like that, certain kinds of antennas perform better than others. It turned out that most links were using .25 to .3 F/D antennas because of their excellent sidelobe and noise performance. However, what was good for a land microwave system was not necessarily good for a satellite communication system.

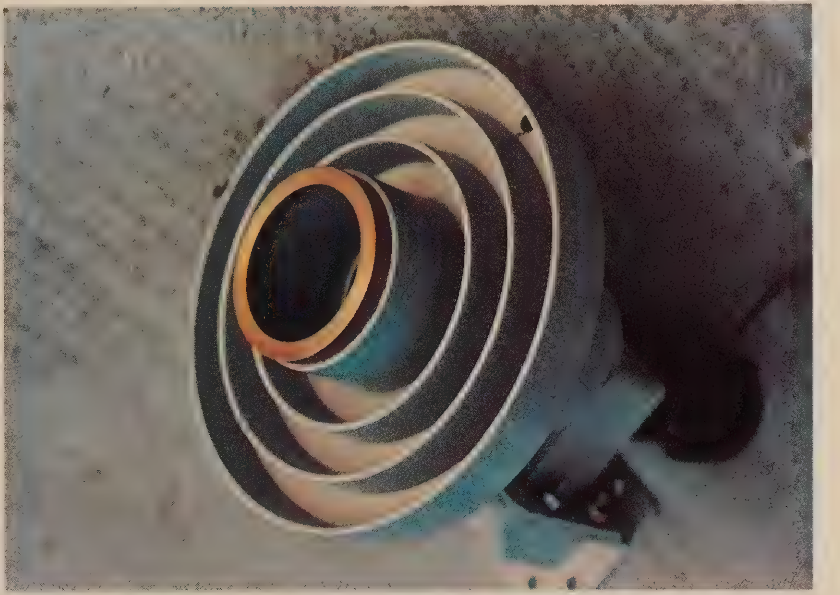
Terrestrial links run parallel to the earth's surface and therefore need to have a minimum of the antenna "seeing" the surface of the earth. Satellite systems are generally looking up and away from the surface of the earth and, within reason, don't need to worry about sidelobe performance or antenna noise. One of the trade-offs when using a deep antenna was in gain versus sidelobe and noise performance. As the antenna became deeper, that is, low F/D, the gain dropped but the noise and sidelobes got better. The gain drop going from .375 down to .3 F/D is in the area of −1.0 dB but the noise gets so much better that the change in carrier-to-noise ratio is only about −0.5 dB. This gain change is caused by the feed system not being able to "see" all the antenna's reflecting surface equally well. Another way of saying this is that the feed sees the center of the antenna better than it sees the edge of the antenna. As the F/D drops so does the feed's peripheral vision. With the standard scaler feed like the Chaparral Super feed or Polarotor, the illumination taper as it is called; is on the order of 17 dB for a 0.3 F/D antenna and 12 dB for the 0.375 F/D antennas. Any signal coming from the edge of the antenna is reduced by 17 dB as compared to the signal coming from the center of the antenna. This difference in illumination taper is the reason for the gain difference between a deep antenna and a shallow one.

This brings me to the point of this article. Two companies have introduced new feeds that are supposed to improve the performance of all those 0.3 F/D antennas that are currently in use. These feeds, put out by Chaparral Communications and Seavey Engineering Associates, are supposed to better illuminate the deeper antennas for better gain without increasing antenna noise or sidelobes.

I ran a series of seven tests utilizing 5 antennas all with F/D's of 0.25 to 0.3 to determine how well each of these



Chaparral Polarotor II with .3 F/D Adaptor Ring.



Chaparral Polarotor II with .3 F/D Ring Installed.

Seavey Eng. ESR-40X .3 F/D Feed.

new products performed. The objective was to determine if the gain increase was as advertised and what effect, if any, the feeds had on sidelobe and noise performance. The test procedure used was the same as that outlined in the Nov./Dec. issue of "Satellite TV Magazine". I will not bore you by going through that procedure. This will give you an excuse to bug your friends for their earlier copies of this magazine.

As you can see by the pictures, the Seavey feed, called ESR - 40X, is a whole new feed just for deep antennas. The Chaparral feed is an adaptor ring that is installed on the front of their standard feed.

There were also subjective tests performed. I installed a Chaparral .3 feed ring on a 6 ft .25 F/D antenna and the only way I know that it improved the system was that the owner wouldn't let me remove it. It had to stay on his system. A number of other Chaparral feed rings were sent out to different users and the reports were about as my data indicates, some saw a lot of improvement and some saw very little if any.

As the data indicates, both feeds raised the sidelobe performance about 1.0 dB. This isn't a significant change as most prime focus antennas will normally maintain their sidelobes in the 15 to 20 dB range. The antenna noise rise is a little more important. The 10 degree rise by the Chaparral feed is not a problem, but the 40 degree rise of the Seavey indicates that the illumination pattern of the feed is a little too wide, and it is picking up a lot of the surrounding earth noise. This is also born out by the lower improvement in C/N of the Seavey feed as compared to the Chaparral feed. They both show C/N improvement; the Seavey feed could be higher if the noise pick up was a little less.

Data.

Carrier-to-Noise ratio.

	Average	Low	High
Chaparral .3 feed	+0.5 dB	+ 0.3 dB	+ 0.8 dB
Seavey Eng. .3 feed	+ 0.3 dB	+ 0.0 dB	+ 0.5 dB

Antenna noise

Chaparral .3 feed = + 10 degrees Kelvin

Seavey Eng. .3 feed = +40 degrees Kelvin

Sidelobes.

Seavey and Chaparral feeds both indicated a + 1.0 dB increase in sidelobe level.

Conclusions

Both feeds do what they say they can do. They illuminate a deep antenna better than a standard feed. All of the data is referenced to a standard feed, in this case a normal Chaparral scaler feed designed to feed .35 to .45 F/D antennas. The C/N improvements are in tenths of a dB over this so called standard feed. I picked this feed to be used as the standard only because this is the feed most likely to be found on a satellite system in backyard use. As indicated earlier, I conducted many different test sessions. The average is just that, the average improvement over the standard feed. The low data indicates the lowest improvement I saw, and the high is the highest improvement that I measured.

Based on the data collected during my tests as well as tests performed by others, not all deep antennas are created equal. You may find that when you install one of these feeds on your antenna that it does not appear to improve performance. The signal strength meter may rise but the pictures don't get any better. If this happens to you the fault is with your antenna, not the feed. Some of the fiberglass antennas do not maintain their parabolic curve all the way out to the edge of the antenna. When you were using the standard feed, it was not seeing much of that outer area of the antenna. Now that you are more properly illuminating the surface of the antenna, any errors out at the lip will have more of an effect than before.

That brings up another trade-off between a deep antenna and a shallow one. The deeper the antenna the harder it is to hold the correct curve over the whole surface. This problem of holding the correct curve seems to be most often found in the Prodelin 8 piece 10 foot antenna. Prodelin is probably the largest manufacturer of 0.3 F/D antennas. All of these antennas represent a natural market for these new feeds. Prodelin makes some of the finest commercial antennas I have ever seen, but in this particular model I have measured as much as ¼ inch errors in the curve 6 inches from the outer lips. As long as we were using the standard feed and under - illuminating the surface the errors didn't matter, but now that better feeds are available these errors will have to be corrected. If you own one of these Prodelin antennas and you want to try out one of these feeds, I would suggest you start with the Chaparral ring just because it is so much cheaper than the Seavey. If you note some improvement, then you can spring for the more expensive feed.

The cost for the Seavey ESR - 40X feed is $260.00. The Chaparral Polarotor I with the .3 ring is $105.00. If you already have the Chaparral feed, the ring itself is $5.00. This ring just snaps into place over the nose of the Polarotor. In both cases, the feeds incorporate polarization control electronics - both the servo feedback type and straight D.C. electric motor type. Both feeds can interface with the new breed of receivers that have the polarization control circuits which are controlled by the receiver electronics.

With any new product there are bound to be problems. After all, we

Continued

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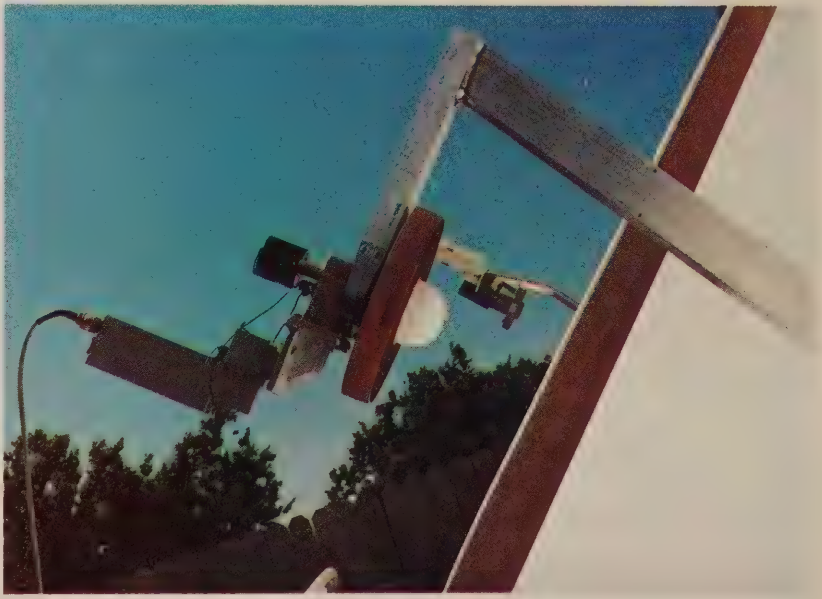
U.S. Master Distributor Wanted. Tel: (819) 569-9521 Telex 05 836258 live in an imperfect world. The Chaparral .3 ring is supposed to slip into place on the nose of the standard feed. The ring will hold itself in place by compression friction. On a few of the feeds on which I installed the rings, the fit was so tight that I ruined one ring before I got it installed properly. The usual method for installing the ring is to hold it in place with one hand and lightly tap the other side of the ring with a "small" hammer. If you get mad at it, bigger hammers are allowed but all warranties are void if the ring is returned to Chaparral bent in a figure 8 pattern! Once I got the hang of it the rings seemed to get easier to install.

I had some very real mechanical problems trying to install the Seavey feed in all of my test antennas. In some cases, I was not able to install the feed at all. Whether we like it or not, Chaparral feeds are used on 95% of the non-commercial satellite systems in use today. For a company like Seavey to not make their feeds mechanically compatible with their main competition is not a very smart thing to do. All I ask is that the throat size and bolt pattern be the same on both feeds. If you, the user, are going to buy some other product to try out in your system, you don't want to be forced into rebuilding the system just to try it out. I would strongly recommend that Seavey look into making their feed such that it will bolt into the same support that the Chaparral system uses. This will greatly expand the number of possible retrofit sales for the ESR - 40 X feed. As it is now, there is ony one feed support that will accept both the Chaparral and the Seavey feed without getting out the hacksaw. This is the figure 7 feed support used most often on the Prodelin antennas.

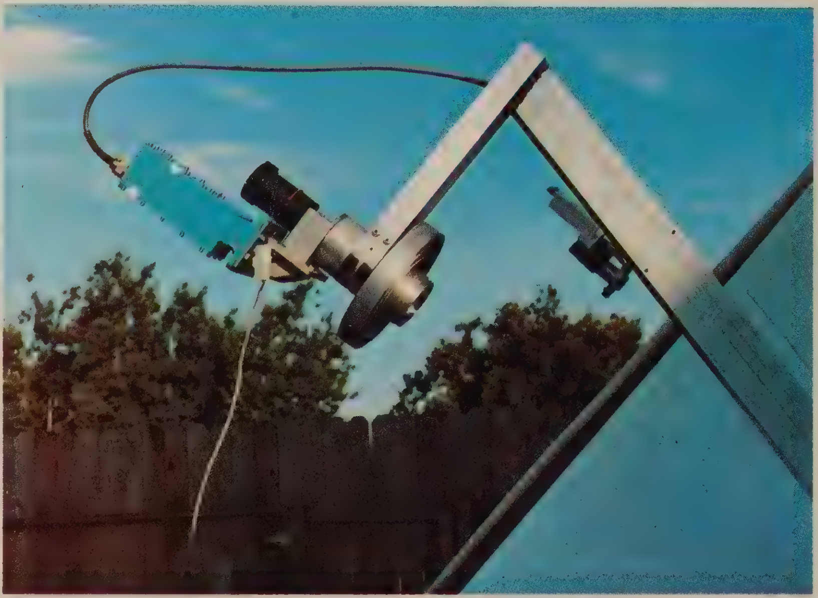
Both of these products perform as they are supposed to. Now that there are new feeds on the market for the deeper antennas, the overall system performance can be optimized. The antennas with poor parabolic curves will no longer be able to hide behind an under-illuminating feed. These antennas will have to be corrected so that the consumer can take full advantage of the total reflecting surface. This will become more critical as market pressures push for the smaller antennas with large antenna performance. If the efficiency of smaller antennas can be improved by using one of these feeds, then smaller antennas might be usable under 2 degree satellite spacing and satellite power loss.

If you elect to try out one of these feeds, I would be interested in hearing from you. Drop me a line and let me know how it worked on your system. If I get enough of a response, I will report your findings in a future article or editorial. Until next time, good luck with your system and make sure it is weather-proof. Winter is just around the corner!

★ ★ ★



Seavey ESR-40X Installed In Antenna.



Chaparral .3F/D Feed On Antenna. Note Adapter Ring

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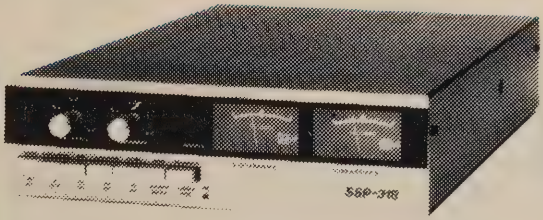
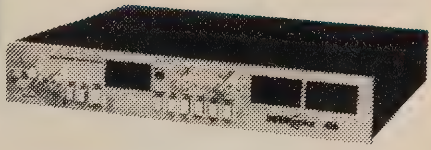


ARUNTA SSP-318
stereo processor



ARUNTA 416 INTERCEPTOR
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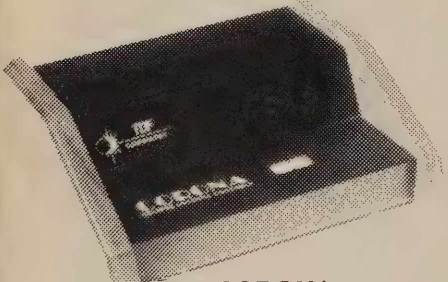

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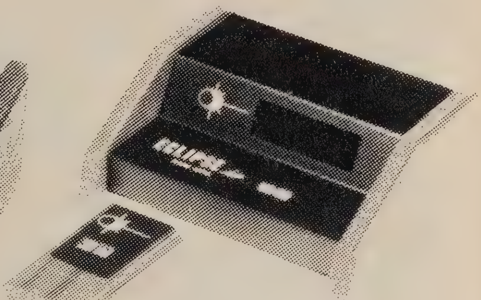
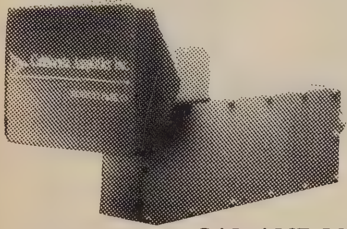
TDF ECLIPSE 1
programable controller



TDF ir WIRELESS
antenna controller



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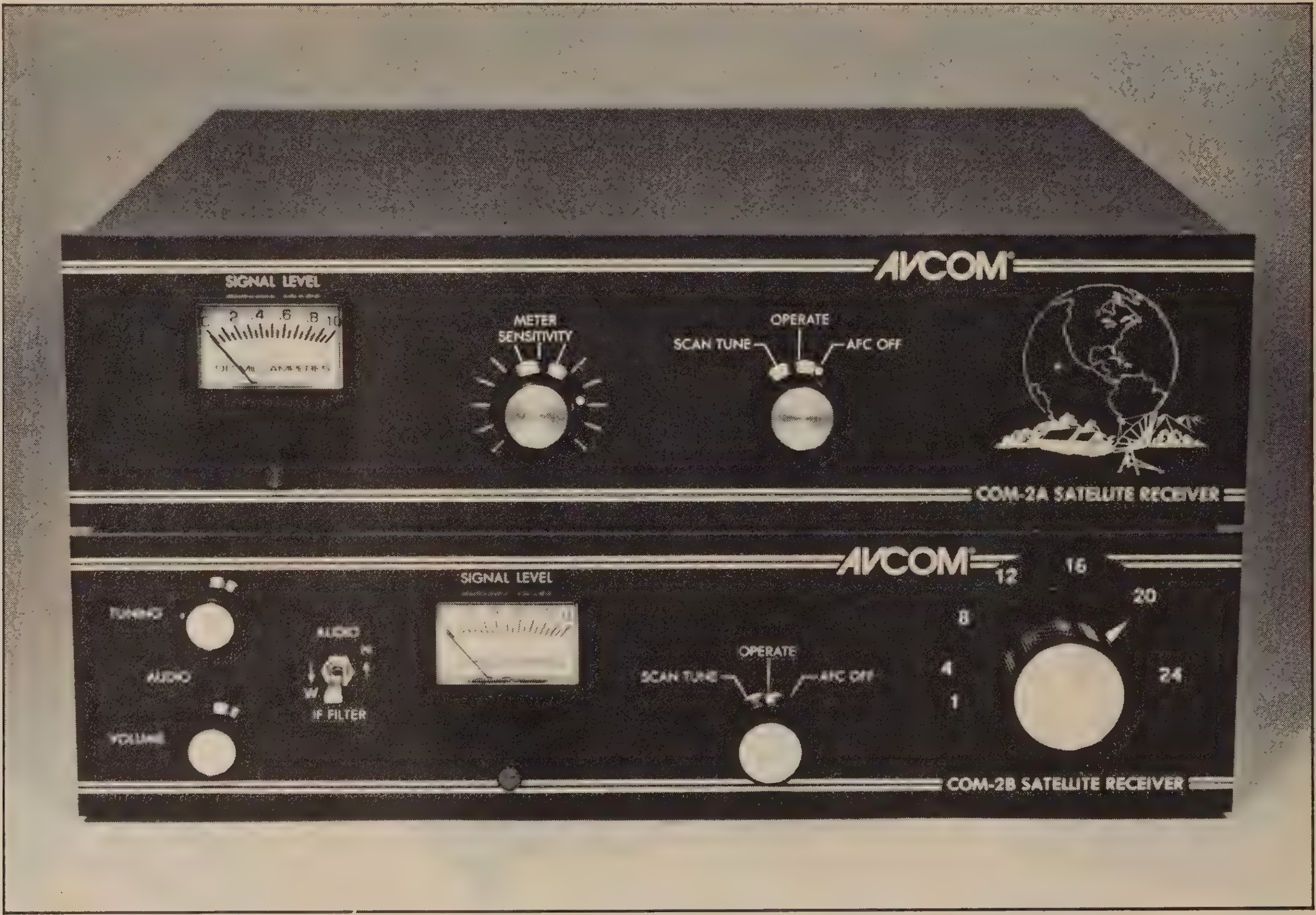
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COM-2B SATELLITE RECEIVER

Avcom COM 2A Satellite Receiver

Avcom of Virginia, although not one of the big volume producers of satellite TV receivers, has a well deserved reputation for manufacturing a high performance receiver (with a minimum of bells and whistles). Andy Hatfield, president and founder of Avcom believes good basic performance should come before the "window dressing". Avcom has been in the consumer satellite TV market as long as anybody and dates back to 1979. For two years Andy Hatfield set the standards for performance in the home market.

The Com 2A has evolved from the original Com 2 introduced in the summer of 1982 and performance wise the receiver certainly lives up to the standards of its predecessors. The receiver comes with a wired remote control from which all functions of the receiver can be controlled including continuous tuning channel selection, audio tune, audio volume, wide or narrow audio filter (280 KHz and 100 KHz), AFC defeat and scan. Most controls must be switched from the remote control since the front panel of the receiver only contains a signal strength meter, adjustments for meter sensitivity, scan control and AFC defeat. This receiver is designed to be located out of the way and all operational controls can be accessed from the remote unit. In fact, you could hide the receiver completely out of sight if you buy the new optional remote control unit for the Com 2A. This remote control has all the features of the standard remote plus a field strength meter. Very handy!

Rear panel connectors include 70 MHz IF input (from the downconverter), audio and video (RCA jacks),

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AVCOM COM-2 A & B SATELLITE VIDEO RECEIVER

SPECIFICATIONS

DOWNCONVERTER, RDC-10 - REMOTE

Input Frequency: 3.7 to 4.2 GHz
Input Impedance: 50 ohms
Input Level: −55 to −25 dBm
Bandwidth: 500 MHz
Flatness: ± .8dB/100MHz
IF Output Frequency: 70 MHz
IF Output Bandwidth: 36 MHz
IF Output Impedance: 75 ohms
Image Rejection: 23 dB nominal
Supply Voltage: + 23 V.D.C.
Tuning Voltage: −6 to −14 V.D.C. nominal (via IF coax)

RECEIVER, COM-2

IF Input Frequency: 70 MHz
IF Input Impedance: 75 ohms
IF Input Level: −50 to −20 dBm
IF Bandwidth (standard): 28 MHz
(other bandwidths available)
Threshold Level: Better than 8 dB C/N

Video Specifications

De-emphasis: CCIR 405-1, 525 lines
Frequency Response: to 4.2 MHz
Dispersion Removal: 43 dB nominal
Output Level: 1 volt p-p
Output Impedance: 75 ohms
Output Polarity: Standard, Negative Sync
(Polarity is internally reversible)

Tunable Audio Specifications (Standard)

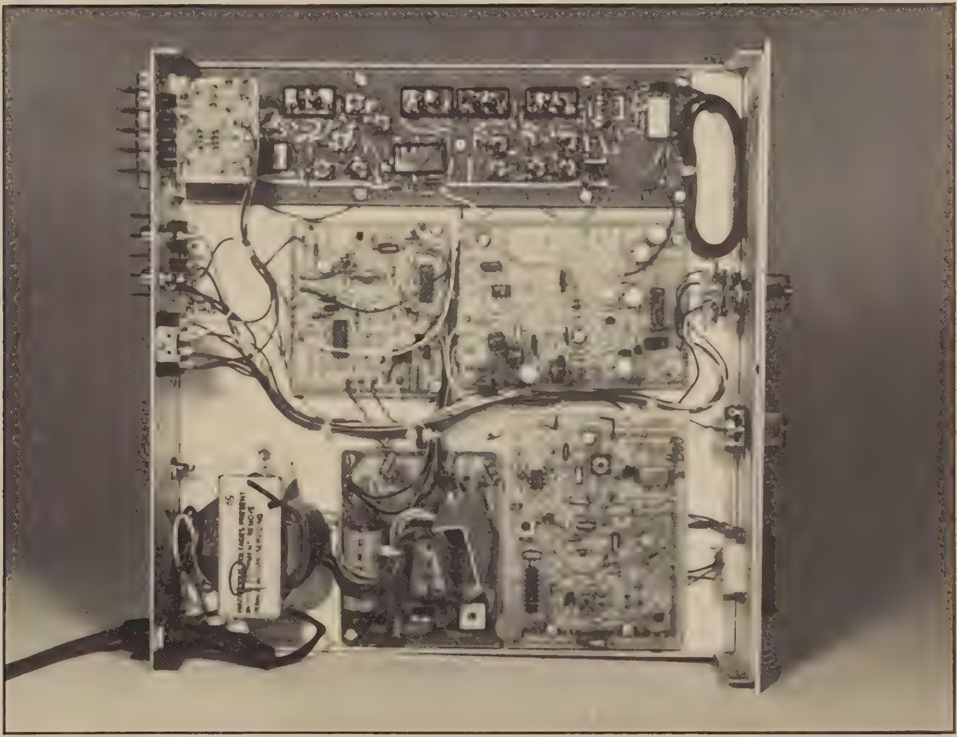
Subcarrier Frequency: 4.5 to 8.0 MHz
Bandwidth, Dual: 280 KHz wide, 120 KHz narrow
De-emphasis: 75 microseconds
Frequency Response: 100 Hz to 15 KHz
Output Response: 600 ohm balanced or unbalanced
Output Level: 1 Volt, adjustable

remote control (12 pin Jones plug), and a 23 volt output for the downconverter. Optionally available is a modulated (channel 3 or 4) RF output, a video baseband output (unfiltered video for stereo processors) and 4 pin terminal strip which interfaces to the Chaparral Polarotor 1. Downconverter tuning is DC coupled through the 70 MHz IF cable. Avcom recommends a **minimum** of 120′ between the downconverter and the receiver and runs of up to 600 feet may be used without undue attenuation.

The downconverter contains a relatively conventional single conversion image reject type mixer with a 70 MHz hybrid amplifier to boost the output to the receiver. It connects to the LNA through RG 214 (45 ft max.) or RG 217 (100 ft max) coax with N

RIGHT: The Com-2A satellite receiver with the optional remote control. The standard remote is identical except for the signal strength meter. (Note Cable Connecting Remote With Receiver). LOWER RIGHT: Spacious layout of this chassis makes servicing easy. (Note Coaxial Delay Line in Upper Right Hand Corner).

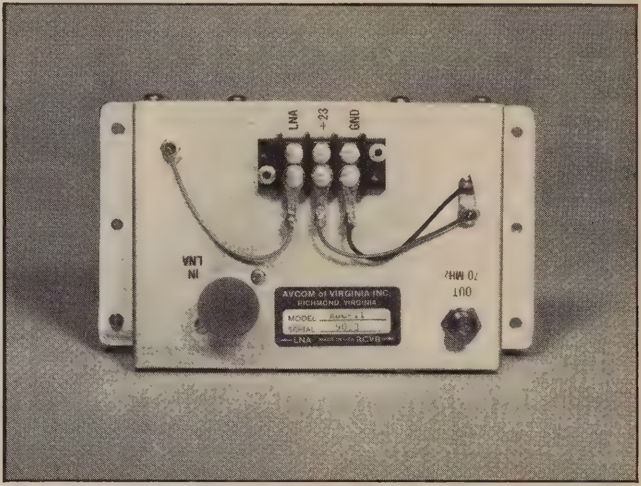
AVCOM
COM-2 SATELLITE RECEIVER
AVCOM
COM-2A SATELLITE RECEIVER



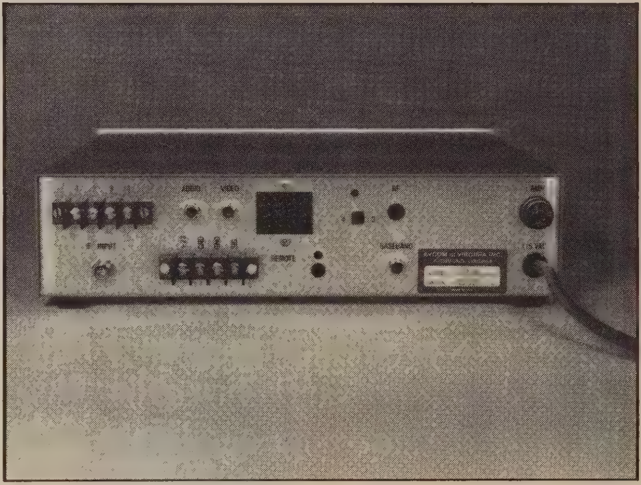
connectors. Since the unit is not weatherproof it must be enclosed in a Nema type enclosure or located in the house which is not a problem as long cable runs can be tolerated between the LNA and the downconverter. Avcom does offer a weatherproof enclosure as an option.

The receiver circuitry is laid out on individual circuit boards -- five in all. 70 MHz bandpass filtering is accomplished using conventional LC (Inductive/Capacitive) filters with hybrid amplifiers interspersed. A coaxial delay line demodulator and a Mini

RIGHT: The Avcom downconverter must be enclosed in a weatherproof box if mounted outside. You can obtain such an enclosure from Avcom as an option. BELOW: The Com-2B is basically the same receiver without remote capability. LOWER RIGHT: Rear view of the COM-2A receiver.



AVCOM
SIGNAL LEVEL
COM-2B SATELLITE RECEIVER



Circuits Laboratories mixer remove the information from the carrier which then feeds through a CCIR filter to the video and audio processor stages. The overall design is conservative, uses standard components throughout, and is extremely field serviceable.

Audio and video performance has historically been top notch with Avcom receivers and the Com 2A is no exception. The receiver offers low threshold performance (minimum signal) and of the receivers tested by STV Magazine - only the Arunta 421 has equalled the sensitivity. The IF bandwidth checked out at 28 MHz (3 dB) which provides excellent detail and color clarity. The picture was pleasing to watch and sparkles on weak transponders were not objectionable and in fact seemed much smaller and softer than most receivers.

There is very little to fault on this "no nonsense" receiver if you are not overly concerned with aesthetics. The Model COM 2B has identical circuitry to the COM 2A but does not have the remote control feature - instead all controls are on the front panel of the receiver.

A limited warranty of 120 days does seem skimpy although in all fairness Avcom has a reputation for looking after their customers long after the warranty has expired. The owners manual supplies all the interconnect instructions but is very short and lacks any trouble shooting assistance. The receivers do not come with any interconnecting cables or connectors (except for the remote control cable on the COM 2A).

At a list price of $995.00,($965.00 for the COM 2B) the receiver is not cheap by today's standards but does offer excellent performance.

★ ★ ★

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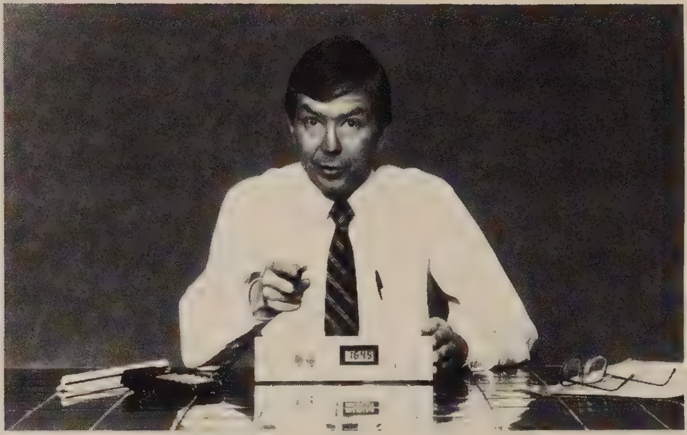
"I was sick and tired of undependable earth station controllers.



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President

I'm an engineer, so I made one myself! I'll stand behind this one."

The best earth station controllers on the market are programmable, reliable, easy to operate and priced right. When I looked closely, I soon found several design flaws which could have been corrected before they were put on the shelves.

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My wife sometimes says I'm stingy. She's right, but I also understand that quality costs less in the long run. So, I keep an eye on every penny and I make sure that our products are the very best.

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Here are the features that make the Surveyor the best on the market today:

1 **2-Year Warranty** I know the Surveyor Eleven works, so I'll give you a two-year warranty on parts and labor. See what our competition offers.

2 **Reliability** No other controller uses a true closed loop servo system which gently starts and stops the motor. You get much longer life from your motor, gears and actuator.

The Surveyor Eleven prevents motor burnout by limiting maximum torque and by delaying reversing power.

3 **Safety** The Surveyor Eleven has UL Registered 90 VDC motor drive circuits.

The red LEDs tell you when your actuator has reached the adjustable maximum limits.

Both red LEDs light up if a control wire is disconnected, saving you the expense of a service call.

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5 **Locks on Target** The Surveyor Eleven is immune to miscounting from stray noise pulses.

It's also so accurate (within 0.030 inches of dead center) that it doesn't need fine tuning.

Settings won't drift because our circuits compensate for line voltage fluctuations, temperature change, aging and noise pulses.

6 **Optional Remote Control** The optional remote control unit brings the convenience of the Surveyor Eleven right to your easy chair.

7 **Easy Operation** The Surveyor Eleven is simple to install, simple to program and simple to operate.
One knob selects up to 12 satellites.

This earth station controller has something entirely new. All the same reliability features you have come to expect in the Surveyor Seven are now in the new Surveyor Eleven–plus three new features that put us further ahead of the pack:

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2 **Polarization** You can set the Surveyor Eleven to horizontal, vertical or receiver/remote polarization with the turn of a knob. No need for a separate box.

3 **Scan** Exclusive to the Surveyor Eleven is the Scan function. It allows you to search through all 24 channels for the one you want without switching from horizontal to vertical polarization.

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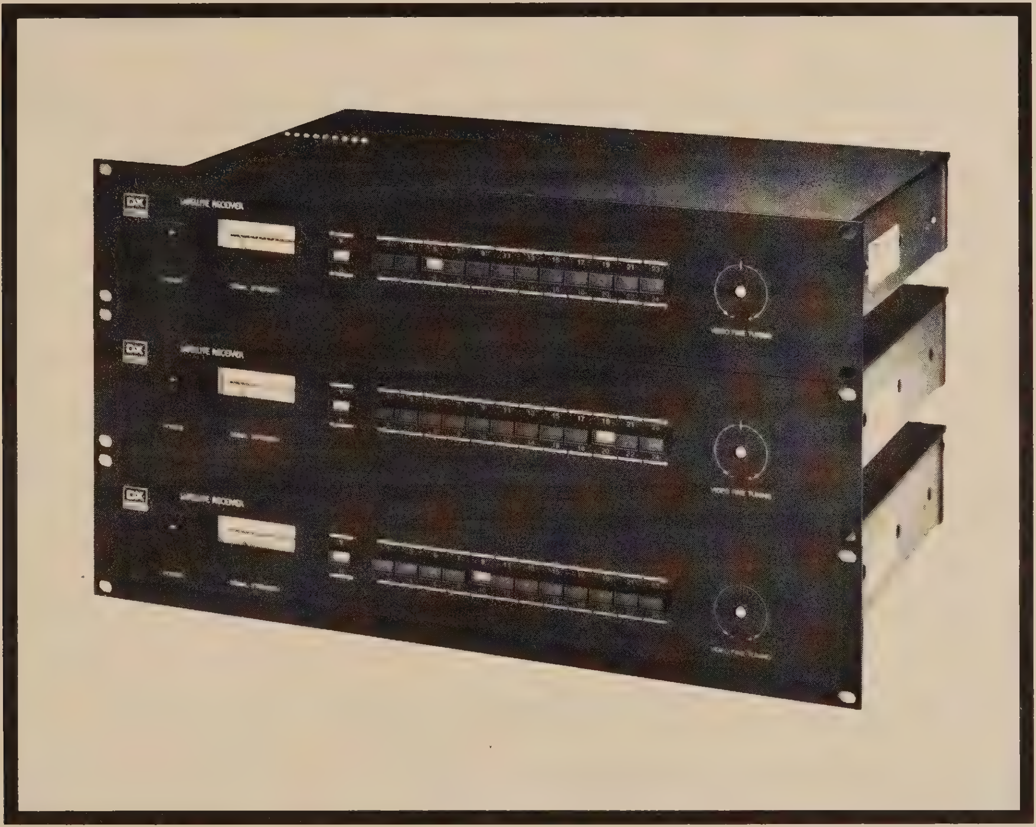

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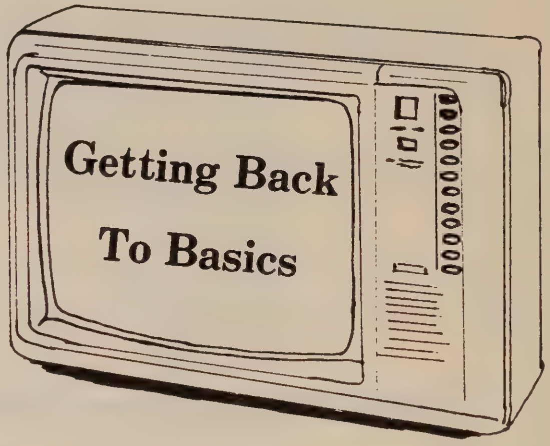
The Power Supply
Part II



By Gary Wheelus

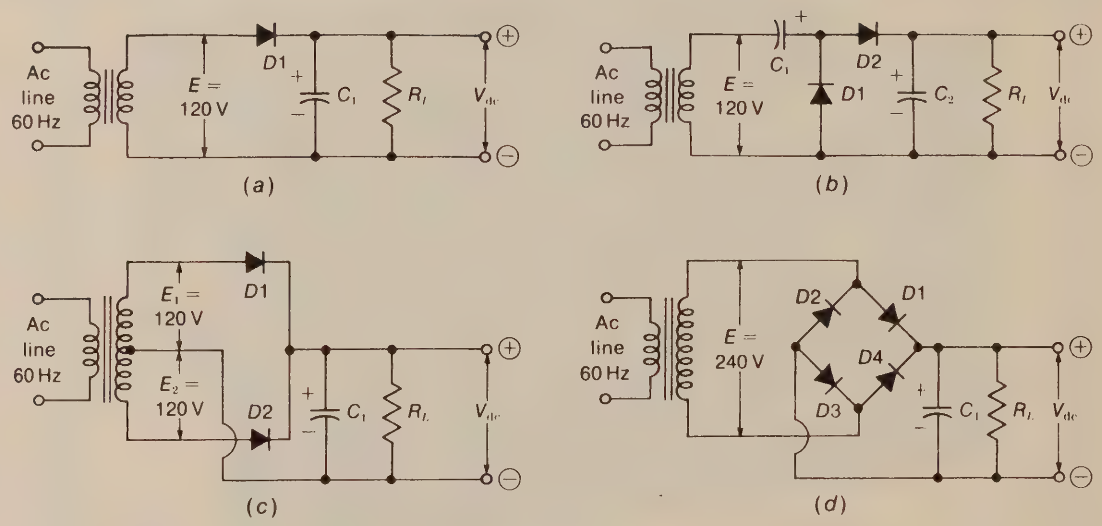


Figure 1. The Four Most Common Types Of Rectifier Circuits, (a) Half-Wave. (b) Half-Wave Voltage Doubler. (c) Full-Wave, Center-Tap. (d) Full-Wave Bridge.

Figure 1 shows the four most common types of power supplies: The half-wave, the half-doubler, full-wave center-tap, and full-wave bridge. All these circuits are shown with an isolating power transformer, but they could be connected directly to the AC line (except for the full-wave rectifier in (c) which needs a power transformer for the center tap. The polarity of the DC output voltage is positive in this illustration, but it could be inverted or made negative by reversing the diodes.

The approximate amount of DC output voltage can be calculated by a formula if we assume certain conditions exist or if we know some of the controlling factors of the power supply. In figure 1, we will assume the diodes are silicon diodes and the load current is 300mA. The formula is VDC = 1.2 times Erms (Where Erms = 120 VAC). The factor 1.2 is used for a power supply having an input capacitor (C_1) and silicon diodes. Using this formula we find that the DC output voltage for the half-wave rectifier in (a) is 1.2 × 120 = 144 VDC. For the voltage doubler in (b), the DC output is 2 × 144 = 288 VDC. For the full-wave center-tap rectifier in (c), the output is 144 VDC. In this example, we assume the total AC secondary voltage is 240 V, with 120 V for E, and 120 V for E_2.

In (d), the full-wave bridge rectifier uses the entire AC secondary voltage for DC output voltage. The DC output here would be 288 VDC with 240 VAC input to the bridge.

The half-wave rectifier is again illustrated in figure 2. The half-wave rectifier is fundamental to all types of power supplies, because any one diode by itself can be only a half-wave rectifier. The other circuits are just combinations of half-wave diodes. A full-wave rectifier is really two half-wave diodes back to back, to conduct on opposite polarities of the AC input. A voltage doubler can be considered as two half-wave rectifier circuits that are effectively in series for DC output voltage.

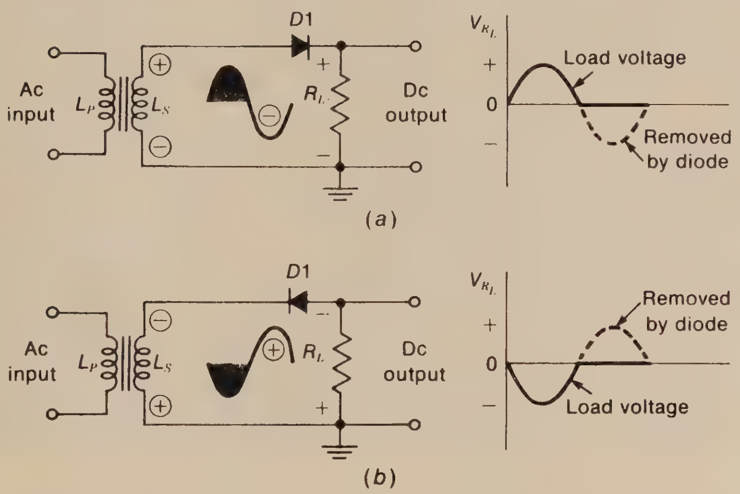


Figure 2. Half-Wave Rectifier Circuits Without Filter, (a) Positive DC Output, (b) Diode Reversed For Negative DC Output.

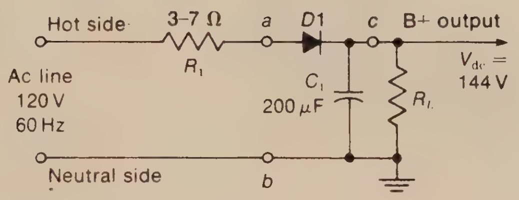


Figure 3. Line-Connected Half-Wave Rectifier With Filter

Figure 2 (a) and 2 (b) show the opposite diode connections that make the DC output voltage either positive or negative. No filter capacitor is shown here in order to show the basic waveforms of half-wave rectification. The diode in (a) only conducts on the positive half-cycle of the AC waveform, while the diode in (b) conducts on the negative half-cycle.

No power supply transformer is used in figure 3 for this illustration of a typical half-wave power supply that is not isolated from the power line. C_1 is the filter capacitor which is used to remove the 60 Hz AC ripple from the DC output voltage. The capacitor input filter is necessary to provide DC output voltage during the time when the diode is not conducting.

R_1 in series with D_1, is used as a surge protection resistor. It limits the peak current through the diode when C_1 is charging. The resistance is generally 3 to 7Ω with a power rating of 5 watts. When a power transformer is used, R_1 is not needed because the secondary winding has the required series resistance. This circuit has positive DC output for B+ voltage. The AC input is applied to the anode of D_1. Notice that the B− side of the power supply is connected to the grounded, or neutral, side of the AC input from the power line to reduce shock hazard.

In figure 3, the capacitor C_1 charges fast through the very low resistance of the rectifier diode when it conducts, but discharges slowly through the load resistance. As a result, C_1 maintains the DC output voltage during the half-cycle when the diode is not conducting. In this process of fast charge and slow discharge, the filter capacitor has the following effects:

1. The 60 Hz AC ripple is practically eliminated from the DC output.
2. The DC output voltage is maintained during the entire cycle of AC input.
3. The DC voltage across C_1 puts reverse bias on the diode so that it can conduct only at the peak of the AC input. As a result, the diode is a peak rectifier.

The waveforms in figure 4 illustrate the diode operation with the input filter capacitor. In 4(a), the sine-wave voltage is shown for the AC input across terminals a and b in figure 3. Note that 120 VAC is the rms value of the sine wave, while the peak value is 1.4 × 120 = 168 V.

The waveform in figure 4(b) shows the DC output voltage across C_1 and R_L in parallel. This voltage is labelled V_{CB} between points c and b in figure 3. Let's assume that the circuit has been operating for a few cycles of the AC input to charge C_1. Then the diode is forward-biased just for the time from T_1 to T_2. Only during this period does the AC input voltage make the disk anode more positive than the DC output voltage at the cathode. Remember that positive voltage at the diode cathode is reverse voltage to the anode that prevents conduction.

During the short conduction time from T_1 to T_2, a large pulse of current flows through the diode and the AC input circuit to charge C_1. As a result, the voltage across the capacitor rises rapidly. The time constant is short with the very low resistance of the forward-biased diode. The peak capacitor voltage is practically equal to the peak value of the AC input voltage, minus the 1 volt drop across the silicon diode.

After the time T_2, the AC input voltage is not positive enough to forward-bias the diode, and it stops conducting. The diode is then an open circuit, and it cannot charge C_1. Then C_1 discharges slowly from time T_2 to T_1 through the relatively high resistance of the load resistance R_L.

The same sequence is repeated for every AC cycle. As a result, V_{CB} across C_1 and R_L in parallel, is a relatively steady DC output voltage, with a very small component of 60 Hz AC ripple.

The peaks of current that flow through the diode to charge C_1, are shown in 4(c). A peak value of 4 amps is shown here. This figure is 10 times the typical forward current of 400 mA assumed for the load.

Actually, the filter capacitor supplies the current to the load for about 90 percent of the time, while the diode is not conducting. During the 10 percent of the time when the diode is on, it allows the AC input voltage to charge C_1 while supplying the load current.

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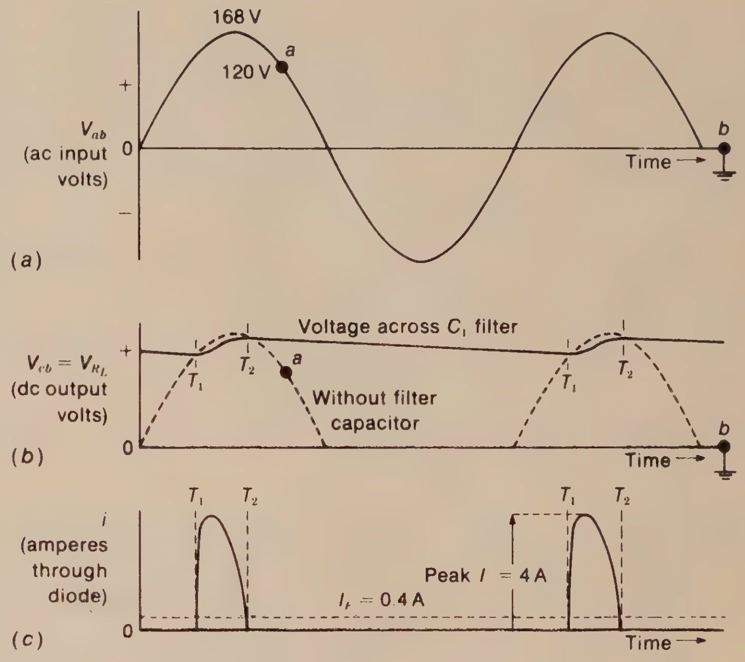

Figure 4 Waveforms of Half-Wave Rectifier. (a) AC Input Voltage V_{ab}. (b) DC Output Voltage V_{cb} Or Voltage Across R_L. (c) Current Through Diode.

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Ford's Continental Concept 100 Brings Satellites To Detroit

By Stan Prentiss

Detroit, Mi. How would you like to go cruising along at some open road speed between 30 and 60 mph, push a button, an instrument panel cathode ray tube lights up and an illuminated road map appears with you on it - or should we say the Electronic Concept 100? If you're in the Motor City, for instance, a chart of the main roads is laid out and your exact position identified. How? The U.S. Navy's Transit satellites are the answer, and Magnavox's modified marine receiver helps do the rest (Fig. 1).

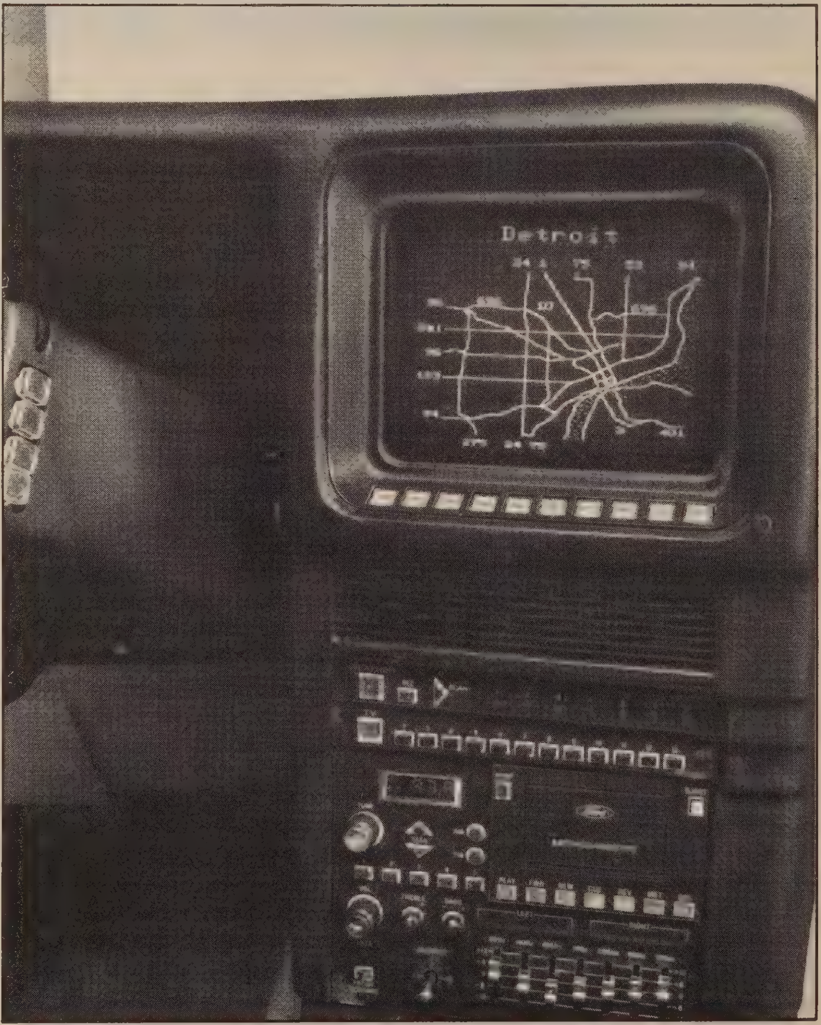

Fig. 1 - Ford's Concept 100 Instrument Panel

A series of these Transits circle the earth in 106-minute Polar orbits at an altitude of 1,075 kilometers (668 miles). Collectively, these orbits effectively resemble a bird cage when overlaps are plotted, and each satellite continuously transmits its position as a function of time.

Using the Doppler method of measuring signals as the satellite approaches, passes overhead, and recedes, the receiver will calculate the automobile's (or ship's) position relative to orbit path. It does this by assessing the vehicle's speed sensor for distance traveled, and is guided by a gimbaled flux-gate magnetic compass automatically compensated for both vehicle deviation and the earth's magnetic variation.

A programmed software routine converts longitude and latitude positions of the auto from satellite contacts and, by dead reckoning, plots its position and the direction of travel on the cathode ray tube display. Should you also wish to "box the compass" by reading its rose, this is available on the CRT, as are latitude, longitude, and next satellite pass information. Area and city maps, are preprogrammed in memory for convenient use when and where required.

Availability

No, the system, isn't immediately available since it's still housed in Ford's experimental continental Concept 100 electronic auto. But, judging from our enthusiastic response when querying engineer Mark Jarvis of the Advanced Instrumentation and Entertainment Engineering Dept., and Public Affairs Chief Jim Allen, Ford will definitely bring the idea and hardware to market in "the late 1980's" at some cost target between $500 and $1,000. Meanwhile, there's considerable work to be done in streamlining the electro-mechanics, cost-cutting, and fitting the entire package conveniently into an instrument panel and/or wherever else portions can be lodged.

As you may surmise, the 9-inch, 6 primary color and black-white cathode ray tube does a great deal more than just display road and vehicle outlines. Reds and blues are used to indicate hot and cool conditions while a 10-grid dual, touch-type plastic membrane covers the cathode ray tube and readily responds to simple finger (capacitative) excitation. If you'd like a glance at the current monthly calendar, time set, date, elapsed time, odometer, fuel economy, etc., just press the designated grid and up pops the information, along with destination distance. But if you'd prefer an automotive system and service interval checkout, then these figures are available, too. Also there are temperature control as well as airflow patterns for the vehicle's various modes of operation such as fan speed, climate control, and interior temperature. Add to this a graphic warning display of the auto's silhouette (Fig. 2) with such indicators as doors open, low tire pressure, etc., and you have the complete package.

The cathode ray tube is operated at nominal television scan frequencies of 60 Hz vertical and 15,750 Hz horizontal scan rates, is of shadow mask phosphor construction with dot-type black matrix and 0.3 millimeter dot spacing.

CONTINENTAL CONCEPT 100

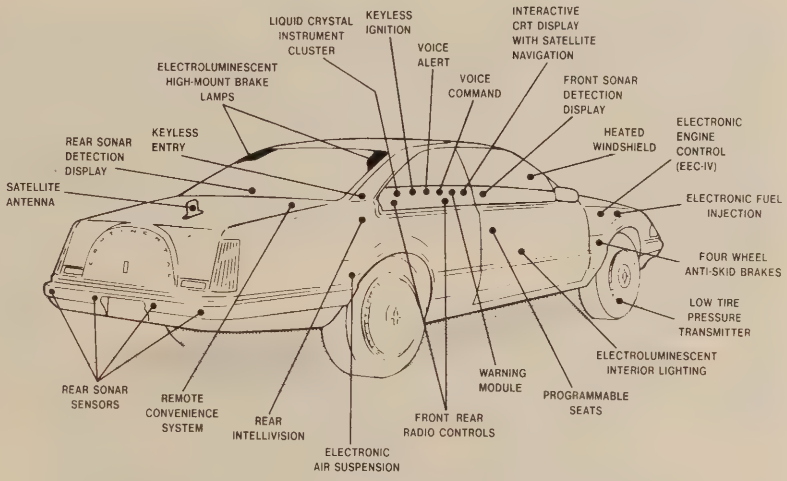
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Fig. 2 - Concept 100 Feature Identification Chart

That's Not All

If that isn't enough, the Concept 100 Ford actually **talks back** in plain English - no VW, Svenska, Mazda language here! "Your lights are on, the trunk is open, check oil pressure, battery discharging, brake fluid low, fuel low, windshield washer needs refilling," are all audible. What's more, the driver can talk back. Via a microphone near the steering column, he can call for the antenna to be raised or lowered, wipers and headlights turned on and off - all via **trained** voice recognition in the vehicle's vocabulary.

Then there's a remote pushbutton transmitter that unlocks doors, blows horns, releases trunk lids, ignites courtesy lamps, and flashes lights for car location and dangerous conditions. You will also find keyless entry ignition, all done with special user codes and pushbuttons, and sonar detection system warnings to the driver for obstructions, as well as parking distance between his or her car and adjacent vehicles.

Naturally you'll find an all-electronic AM/FM stereo radio, joystick control for speaker balance/fade, a weather scanner, sound system for TV audio pickup, and a 5-inch color Intellivision screen for those who want to play games in the back. At 55 mph, Electronic Engine Control IV can read seven engine parameters and change operations in about 300 milliseconds, or less than one full engine revolution. We aren't told if readouts become faster as the engine accelerates, but this is already faster than standard eye perception and that should satisfy most humans at least some of the time. Ford won't say if it's working on autotelevision, but chances are that's in the works, along with some form of convenient cellular radio, as well.

The Navy's Transit Satellites

Weighing about 115 lbs. and whizzing around the earth in Polar orbit every 106 minutes, these tiny satellites - there are five - have been operational in their 600-mile nautical flights since 1964 and still continue to be supported by the U.S. Navy's submarine service.

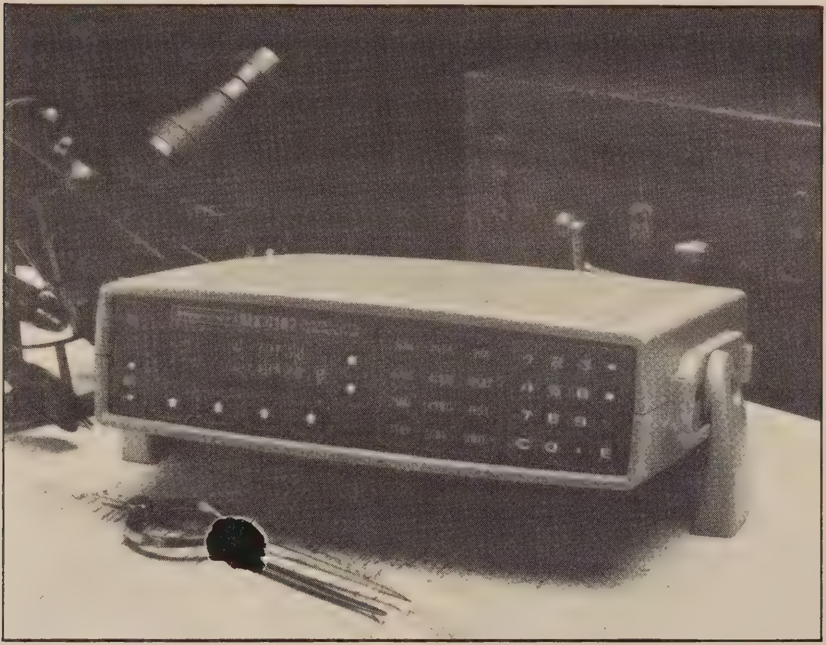
During July 1967, however, civilian access was authorized and today there are an estimated 40,000 users on both land and sea. Operations are based on the Doppler principle of rising and falling frequencies, with signals modulated by the satellite's relative location in space. This results in a line of positions originating from Doppler emissions. The receiver may then establish a fix or position for whatever ship or vehicle's involved.

If you plan to gin one of these units up yourself, receivers are priced between $1500 and $100,000 depending on accuracies required and whether both 150 and 400 MHz frequencies are necessary to establish a fix. At present, best accuracy amounts to 185 meters, but in the 1990's when Transit is to be replaced by the Global Positioning System, accuracies will improve by more than a factor of 10, to 16 meters, according to Jerry Hoskins and Naval Officers Lt. Tom Yeager and Capt. Bob Munn.

One If By Land, Two If By Sea

Lexington hero Paul Revere would have a tougher time signaling satellite approaches these days than that of the revolutionary British redcoats. For with Magnavox' versatile MX 4102 satellite navigator for ships now being converted to an X02 for automobiles, redheads or redcoats could accurately come from anywhere.

A tiny 11 × 3-inch unit loaded with precision electronics, the 4102/X02 are sisters under the skin except for the following general changes in the X02, including:



Magnavox MX 4102 Satellite Navigator.

1. An automotive antenna and flux gate magnetic compass as part of the externally mounted system.
2. An absolute barometric pressure sensor with calibration provision and special interface for altitude estimation.
3. A clock function for Greenwich Mean Time (GMT).
4. An internal battery to maintain time and important memory operations with operating power off.

All this permits the X02 to determine the automobile's position directly from satellite fixes; select best signals for accurate tracking; dead-reckon positions either manually or automatically, as preferred; show error conditions and continuously deliver GMT to the nearest second. The rest is similar to Magnavox' standard MX 4102 satellite ship navigator that does lots more.

Using the MX 4102 on the bounding main, you can have all the basic information at your eyeball/fingertips by just entering your appropriate location , time, date, and antenna height. Or perhaps you'd like trip planning layouts up to 9 waypoints, compare Great Circle and Rhumb Line routes, or compensate for magnetic compass deviation.

In the adjacent Table you'll see explanations for a dozen abbreviations on the center keyboard. These are the keys that **extract** information from the Sat Nav. On the right are 16 key numerals and symbols that **enter** information. Then, on the left, is an alpha/numeric readout in seagreen with a third set of "menu" keys and the on/off switch that permits selection of any specific information available in the 4102's operating mode. Should you want speed, heading, drift and set, time, distance run, satellite fix, or even have the unit respond to newly created conditions, these may all be manually requested.

To calibrate the fluxgate sensor/compass, the vehicle operator simply punches CAL button, turns his car in a complete circle, and a powerful microprocessor calculates readings into magnetic headings. After that, the microprocessor automatically computes local magnetic variations and the job's all done. Best satellite fix accuracy at 400 MHz for the X02 can be calculated using the equation:

$$\text{Sat Fix} = \sqrt{A^2 + B^2 + C^2}$$

Where A = 200 meters static error, B = 200 meters per km/hr unknown vehicle velocity; and C = 1-3 meters/meter of unknown elevation due to possible barometric and altimeter errors. Normal operational power drain amounts to 20 watts, plus an additional 2 watts continuous to maintain an oven-controlled 5 MHz local oscillator with short term stability of one part in 10 to the ninth power. PROMS and RAMS supply over 40 bytes of memory, and best receiver sensitivity begins at −145 dBm.

Computer/X02 bidirectional communications are carried out in HEX-

ASCII format and converted to binary within the X02. Max. 3-byte, 24-bit word lengths are possible, with each internal word being transformed four bits at a time within a HEX-ASCII character. Logic flow is asynchronous with one start, one stop, seven data bits, and an odd parity bit.

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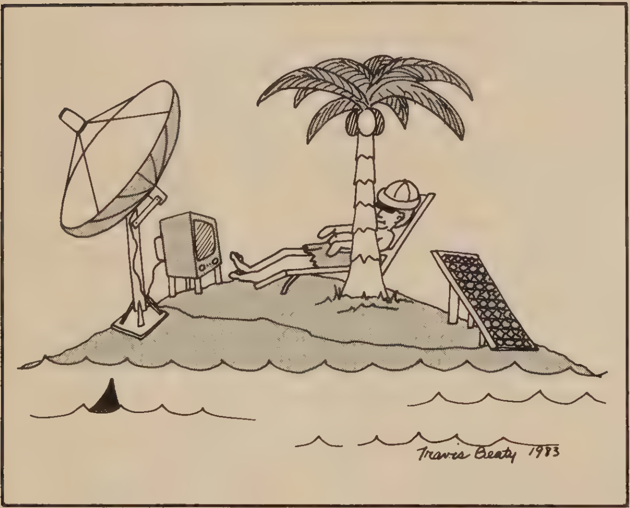

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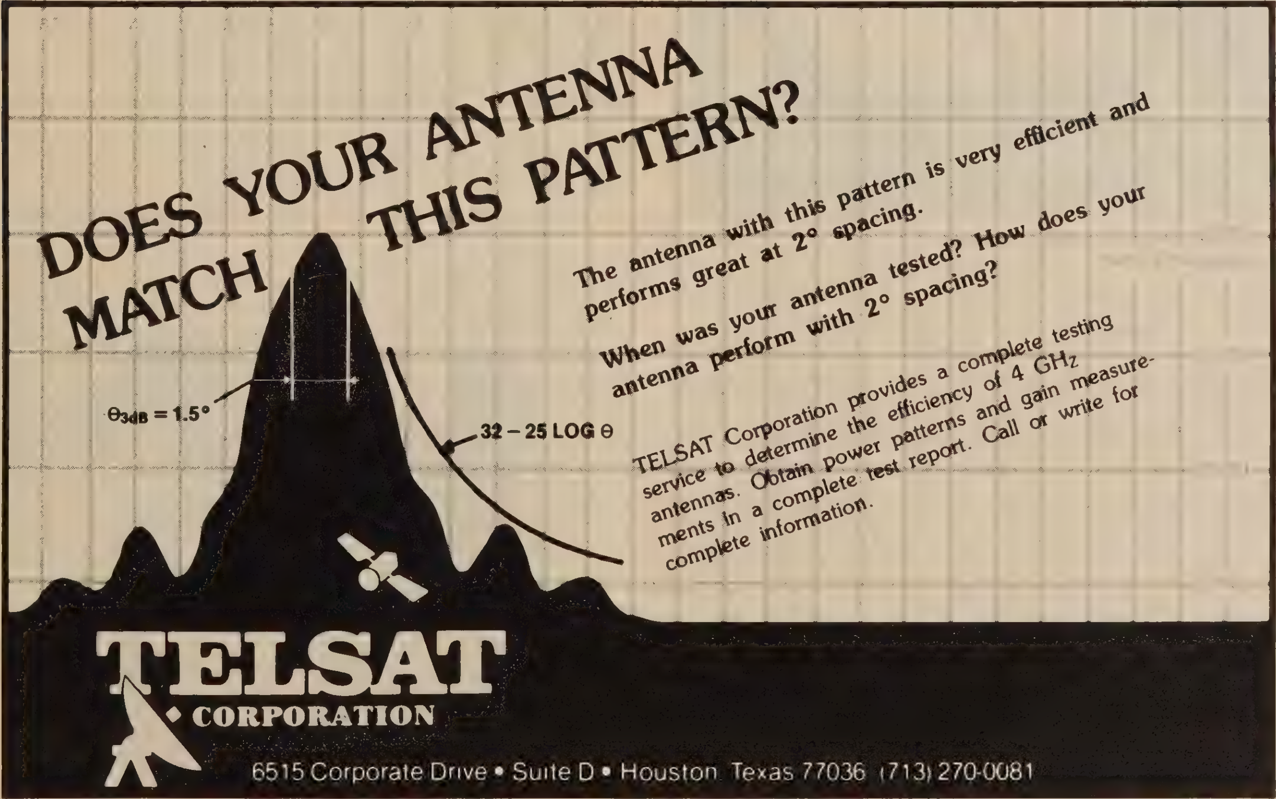

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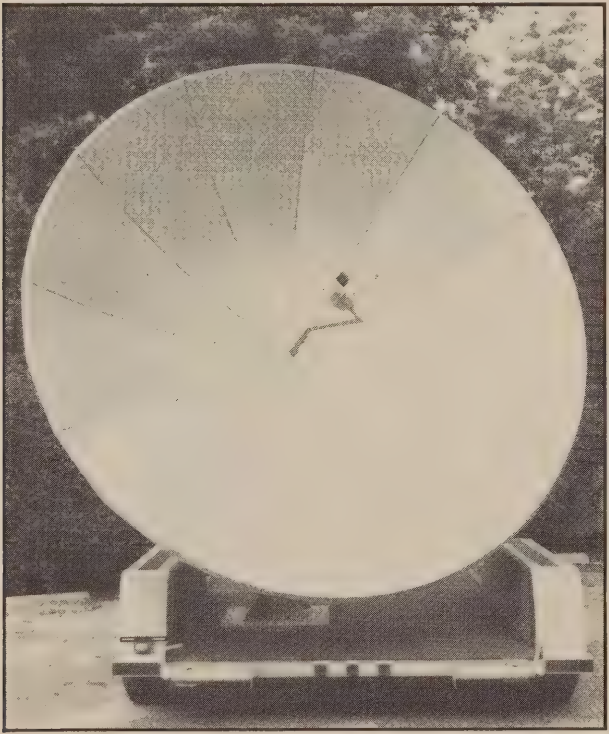
New Product Highlights

ScanMaster Aluminum Antenna

LAKE CITY, SC--Scanmaster Communication Systems, Inc., introduces an aluminum antenna, dye-punched by computer control for a perfect fit and true parabolic curve. The 10′ antenna is manufactured in Mankato, Minnesota and comes in twelve individual sections that can be assembled by a do-it-yourselfer in just a few hours.



In addition to a perfect fit each time, the ScanMaster antenna (model 1012) boasts other features: It's made from aluminum alloy #5052-H34 for high quality and has a .080 thickness for rigidity. Deep-dish construction reduces terrestrial interference and shortens the focal point. The acrylic enamel finish diffuses heat reflected from the dish, thereby keeping electronic components running as cool as possible.

Polar Mounts are included as part of the ScanMaster aluminum antenna package. They are designed with special emphasis placed on tracking ability. A jack screw is standard for manual planning, but a motorized linear activator can be added.

ScanMaster gives customers a 2-year warranty against defective materials and workmanship on all its products.

For more information on this product, contact Mr. Gene Biedscheid.

Mr. Gene Biedscheid
ScanMaster Communication Systems, Inc.
207 St. John Street
P.O. Box 1727
Lake City, SC 29560
(803) 394-2723

"Satellite TV Basics" Videotape

This professionally produced videotape answers most of the basic questions about satellites, satellite programming, what equipment is needed, and how it all works, in just over 12 minutes. It is designed for TVRO dealers to show to customers in their showroom or at county fairs, etc.

Just released at the June CAN/AM Satellite Show in Minneapolis, this tape can eliminate the need for salesmen to answer these basic questions over and over again. Available in both Beta and VHS formats, from:

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Winegard Introduces Full-Function Satellite TV Receiver

BURLINGTON, IOWA - Winegard Company has announced introduction of a new Home Satellite TV Receiver model SC-7032.

The versatile SC-7032, with an attractive consumer designed housing, has a full range of features to fill the requirements of the home satellite TV reception system. Included are channel scan for convenient and quick review of available channels on each satellite, polarity reversal button, signal strength meter for easy video fine tuning control, audio tune, channel select with LED readout, built-in satellite selector control with LED read-out for optional actuator, and built-in polarotor that automatically changes polarization. In addition, an optional channel select remote control with fine tune button and up/down transponder switch is available.

A single conversion down converter with IF output of 70 MHz mounts at the antenna with 72 ohm output for coaxial cable to the receiver. A channel ¾ crystal control modulator is built-into the receiver.

For More Information contact:

Winegard Company
3000 Kirkwood Street
Burlington, Iowa 52601
(319) 752-3607

Automation Techniques Introduces New Home Satellite System

LAS VEGAS, NEV. -- Automation Techniques, Inc., one of the leading satellite receiver manufacturers in the commercial and cable television industries, announced it has entered the home TVRO market with a new equipment package called the GLS-800 -- "Great Little System" -- Series.

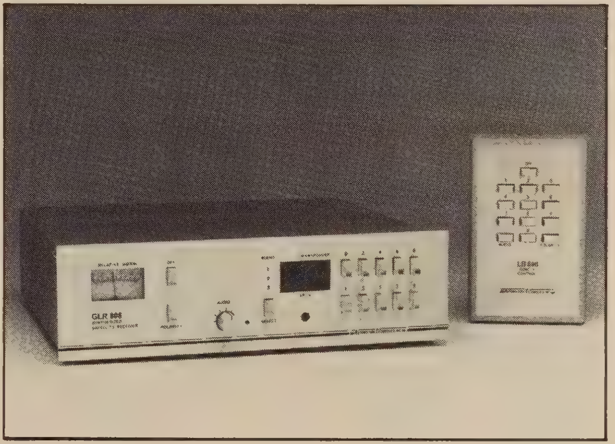
The package includes ATI-produced and technically matched dish, feedhorn, low noise amplifier, downconverter, receiver and remote control. It was unveiled for industry and press personnel at the National Satellite Opportunities Conference held in Las Vegas, March 15-17.

Ted Anderson, president of the Tulsa, Oklahoma-based manufacturer, said the GLS-800 Series provides homeowners across the country access to satellite TV through a reception system that's both technically innovative and affordable.

"We've earned a reputation for technical excellence and affordability in the commercial market," said Anderson. "That same combination is now available to the home market with the GLS-800 Series, which offers more innovative features for the money than any other system."

The new system features single cable control. One cable connecting receiver to downconverter carries all power and control.

The system's GLR-808 receiver features crystal synthesized tuning for stability and automatic polarity control that locks the probe for each channel while correcting for skew. A digital indicator displays channel selections on the contemporary-styled front, and a tunable IF filter on the rear panel allows terrestrial interference rejection.



The LB-808 remote control is an infrared wireless unit that provides full function operation. An optional feature allows use in any room in the house. It has tunable audio plus priority selection of 6.2 or 6.8 MHz.

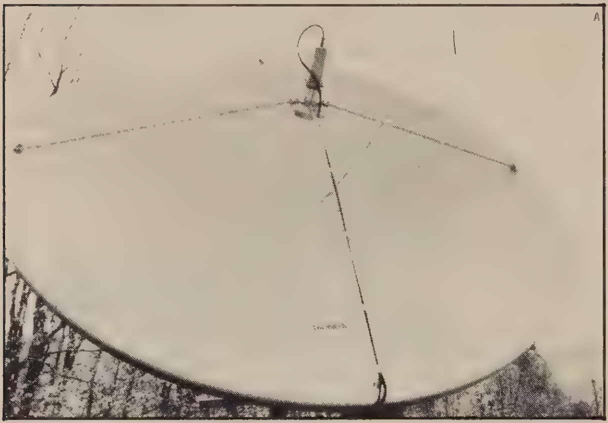
The LNA/polarizer features state-of-the-art design with direct-coupled input to eliminate waveguide transition loss. A new feedhorn optimizes the dish signal.

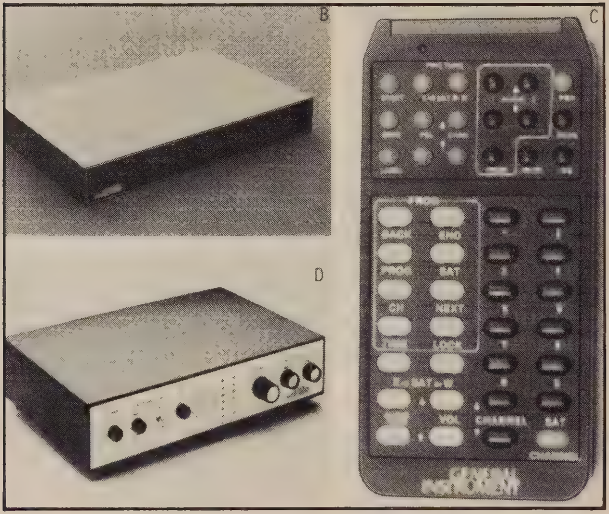
Automation Techniques' dish is one-piece spun aluminum. It is available in 6, 7½ and 9-foot sizes with sturdy polar mount and single-pole support facilities.

For more information, contact Ted Anderson.

Ted Anderson
Automation Techniques, Inc.
1550 North 105th East Ave.
Tulsa, OK 74116
(918) 836-2584

General Instrument Corporations





SHERBURNE, NY -- A complete new family of General Instrument TVRO systems including dish antennas, receivers, and mounts were shown for the first time at the National Satellite Opportunities Conference in Las Vegas on March 15, 16, and 17, 1983.

The deep dish antenna is available in 8, 10, 12 and 15-foot sizes. Sectionalized for ease of shipping, it can be assembled easily and quickly, and the sections are interchangeable. The antenna features short focal length design to provide low noise-temperature performance. The feed assembly is computer designed. The feed assembly requires no focal length adjustments. These rugged, lightweight antennas are covered by a five-year warranty.

The antennas are available with a variety of mounts featuring pedestal, post or tripod bases. All are designed for minimum assembly and easy installation. Standard and extra rugged versions are available.

Two different receivers are offered. The full featured microprocessor based unit allows instant satellite and channel selection using the handheld remote control and automatically selects appropriate polarity, audio subcarrier and format (mono/stereo).

This model is programmable with automatic channel and satellite selection up to six months in advance including parental "lock-out" of undesired programming on any channel regardless of satellite selected.

It also features a video graphic display on the TV screen for time, date, channel, satellite program directory, signal strength, and audio format.

The standard receiver offers features including: LED channel display, Matrix/discrete stereo processor scan tuning, signal strength meter, push-button polarization control, remote down conversion, convenience switch for controlling motorized actuators, and RF modulator.

For more information contact:

R.F. Systems Division
General Instrument Corporation
1 Taco St.
Sherburne, NY 13460
(607) 674-2211

National Microtech, Inc.

GRENADA, MS - Larry Ward, President of National Microtech, Inc. has announced the introduction of the Apollo-Z70 satellite receiver.

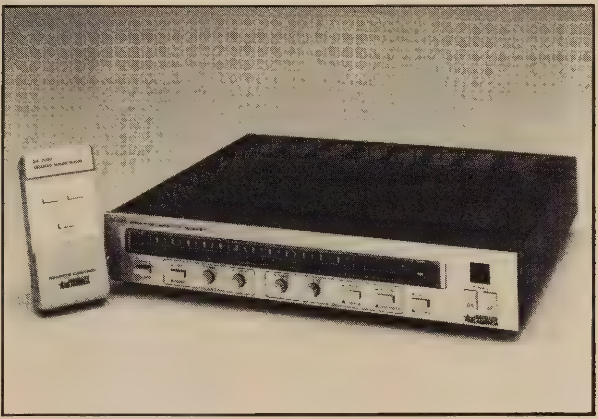
Latest in the Apollo product line, the Z70 receiver is well-equipped for the consumer who prefers a separate downconverter receiver, said Ward. It features step channel selection with automatic polarity switching, fine tune, polarity format reversal, scan tune, tuneable audio, signal strength meter, antenna control switches, invert, remote control option, and built-in approved modulator.

The Apollo-Z70 satellite receiver is housed in a sleek wood-grained cabinet with a black anodized aluminum face plate, Ward continued.

For more information contact:

Ken Brown
National Microtech, Inc.
P.O. Drawer E
Grenada, MS 38901
(800) 647-6144 or (601) 226-8432

Satellite America Marketing



GRENADA, MS - Satellite America introduces a new receiver to its line - the SA-2000.

The new SA-2000 satellite receiver with infrared remote control was introduced to the industry during the recent CAN/AM trade show in Minneapolis.

Among the unit's many standard features are LED transponder selection, full stereo and matrix audio, and wireless remote control. The Satellite America SA-2000 features: reliability, styling, and broadcast-quality performance traditionally offered only on the most expensive electronics.

For more information contact:

Satellite America Marketing
P.O. Box 552
Grenada, MS 38901
(601) 227-1160

Polartron™ III

A new solid state electronic polarizer has been introduced by International Satellite Video Corporation. This polarizer features instant polarity switching, low power requirement (20 ma. typical), minimal insertion loss with up to 180° rotation capability, fully solid state with no moving parts, and compact size and weight.

The Polartron™ III can be powered directly from most receivers providing polarization switching. It is completely sealed from moisture for all weather use and comes with stainless steel mounting hardware.

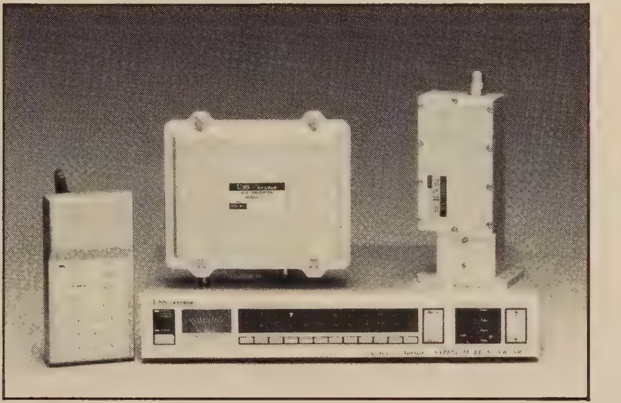
For more information contact:

International Satellite Video Corporation
Box 5685
Orange, California 92667
(714) 633-1370

USS - Maspro Satellite Receiver SR-1

The SR-1 Satellite Receiver System incorporates the latest state-of-the-art technology for a growing industry from United Satellite Systems. The system consists of the SR-1 Receiver, the 100° K LNC, the 2nd Conversion Module, and all cables, connectors and hardware required to install the outdoor modules, including 120 feet of cable for the run into the home.

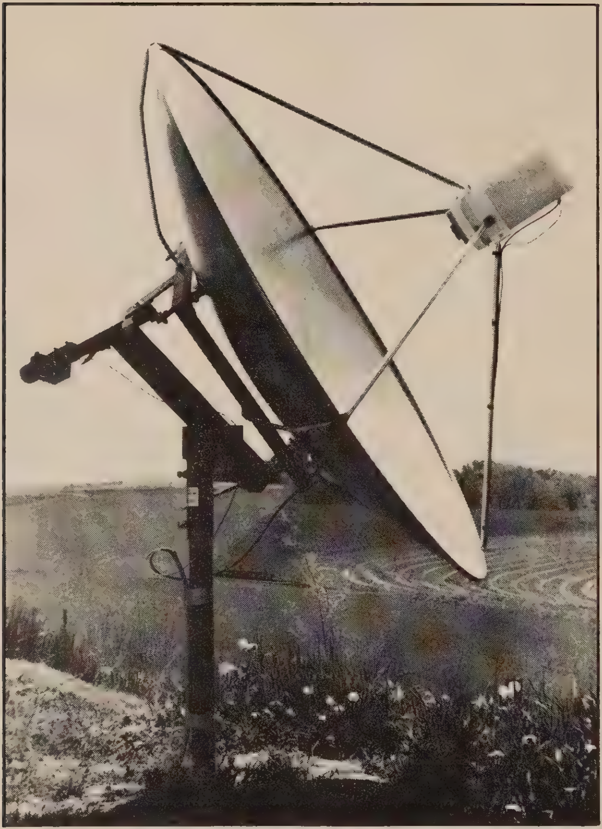
Also featured with the Receiver is an optional Full Function Remote Control which multiplexes a signal through the house wiring, permitting control of the Receiver from any room in the house.



The model SR-1 receiver and remote control unit employ soft-touch push buttons that eliminate the need for fine tuning. LED readouts, dual conversion, and accurate signal meter and an integral modulator are just a few of the features, together with SAW filter technology and true quartz crystal tuning.

For more information contact:

United Satellite Systems
St. Hilaire, Minn. 56754
(218) 681-5615



New Stainless Steel Antenna

Believed to be the only satellite receiving antenna in the industry pressed from stainless steel, the Nova SS made by Kaul-Tronics, Inc., Lone Rock, WI, has met with fantastic acceptance.

According to the manufacturer, the Nova SS, which comes in a 7½′ and 9′ size, is mirror smooth, durable and has greater tensile strength than aluminum.

Kaul-Tronic sales have quadrupled since introduction of the stainless steel antenna. It come with either the prime focus or subreflector feeds.

For more information contact:

Kaul-Tronics
Route 1, Box 292
Lone Rock, WI 53556
(608) 583-4833

Regency Introduces Satellite Antenna

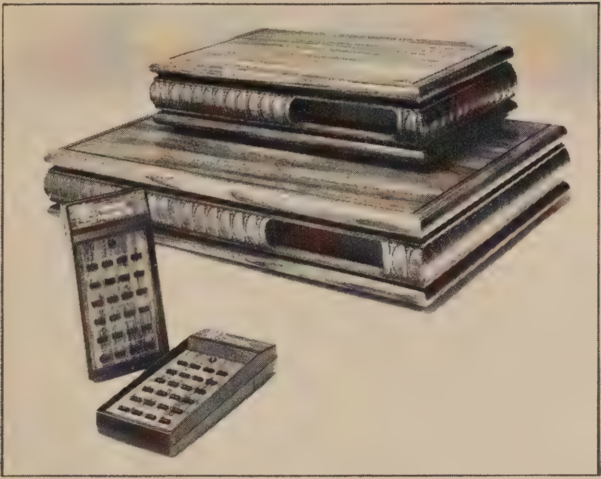
INDIANAPOLIS, INDIANA ..... Regency Electronics, Inc., announces the introduction of the Polaris SA 9000, an antenna for reception of satellite TV programming.

The Polaris SA 9000 features a new computer designed deep profile antenna. The compact design, 90 inches in diameter and the lightweight construction, .090 hard alloy marine grade spun aluminum, makes the SA 9000 ideal for home use. Additional features include accurate surface tolerance for enhanced picture quality, sturdy "button hook" feedhorn design, Chaparral Polarotor, polar mount for rotation of dish to receive all available satellites, and easy to install post mount.

For more information contact:

Regency Electronics
7707 Records St.
Indianapolis, IN 46226
(317) 545-4281

New Look In Receivers



GRENADA, MS - National Microtech, Inc. announced the introduction of the Apollo Elite receiver/navigator system.

Both the receiver and navigator have individual microprocessors with non-volatile memory.

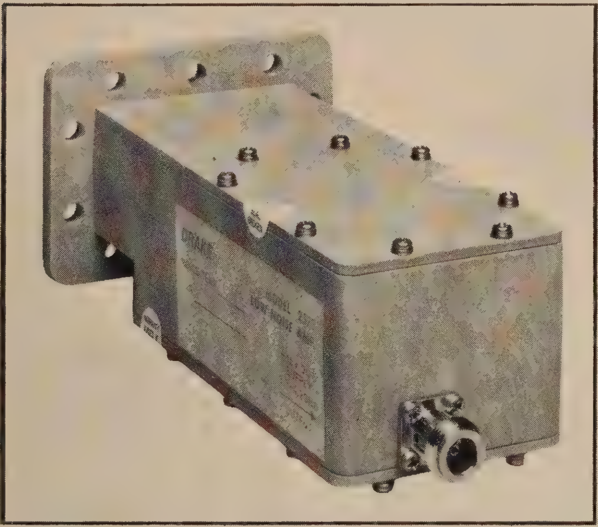
The receiver contains the channel changing control, volume level, audio format and AFC (Automatic Frequency Control). The navigator contains all satellite locations (programmable up to 100 satellites), and antenna drive function - with accurate return to all pre-programmed positions. The navigator can also be driven east or west manually to locate unprogrammed satellite positions.

Ken Brown
National Microtech, Inc.
P.O. Drawer E
Grenada, MS 38901
(800) 647-6144 or (601) 226-8432

New LNA From Drake

The R.L. Drake Company is introducing a new line of "C" band low noise amplifiers for satellite TV reception. Three models are being offered based on noise temperature specifications.

Model 2575 has a noise temperature better than 120 degrees Kelvin, 2574 has a noise temperature better than 100 degrees Kelvin and 2573 has a noise temperature better than 85 degrees Kelvin.



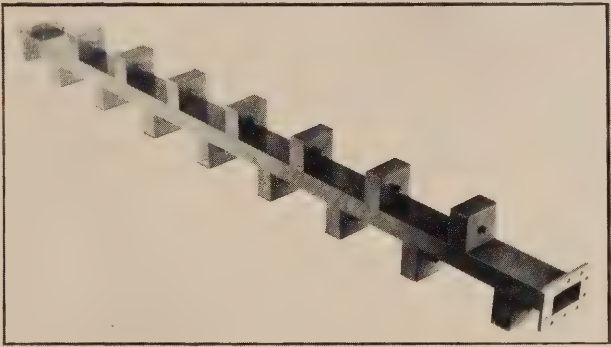
These amplifiers include an integral band filter and have a full 52 dB gain.

A test report is supplied with each unit.

For more information contact:

R.L. Drake Company
540 Richard Street
Miamisburg, Ohio 45342

Telephone Microwave Trap Blocks Up to 25 Frequencies



Type #4168 is a multiple frequency microwave trap for placing 50 dB notches on microwave telephone frequencies which wipeout TVRO channels. The typical 30 dB bandwidth is narrow (4MHz) to preserve transponder bandwidth.

4168 C is custom made to block customer specified frequencies and blockage of up to 25 frequencies can be provided.

The unit is designed in WR-229 waveguide but can also be provided with coaxial, type N connectors with DC power passing provisions.

For more information contact:

Emily Bostick
Microwave Filter Co., Inc.
6743 Kinne Street
East Syracuse, NY 13057
US toll-free 1 (800) 448-1666
(collect (315) 437-3953 in NYS/CAN/HI/AK)

News from Down Under

by Terry L. O'Connor

Satellite Technology Aids Chinese Newspaper

In Sydney, Australia, Sing Tao is a Chinese-language newspaper with worldwide networks. From its Head Office in Hong Kong, copy is transmitted to Branch Offices in Europe, U.S.A. and Australia for local printing and distribution.

Sing Tao has the largest circulation of any Chinese-language newspaper in Australia, with up to five thousand copies daily.

The Sing Tao organization recently installed modern space-age communications equipment in its offices at Goulburn Street, Sydney.

The equipment, which utilizes a series of photographic lenses, and works like a highly sophisticated facsimile machine, is a DACOM 300 Telepress system; the only one of its type in Australia. It is connected via (Telecommunication Commission) modem and landline to the Overseas Telecommunications Commission International Gateway Terminal at Broadway, Sydney. The system receives copy that has been transmitted via Intelsat IV-A (Pacific Ocean Satellite, Primary) on Transponder 7A from Hong Kong, and 9A from Sydney.

By placing film onto a revolving drum, the typeset pages are recorded in Sydney as full newspaper-size negatives which, because of their incredibly fine detail (particularly in the photographic reproduction), can then be processed 'in-house' and sent to a printer for platemaking and printing of the newspaper.

The entire operation, from receipt of the first twelve pages to distribution of the newspaper, can be accomplished in less than 10 hours.

A Director of Sing Tao in Australia, Mr. Lu Yong, sees the introduction of satellite technology as a great step forward for the newspaper. "We are now able to bring current news to our readers, in their own language", he said. "Operation of the system", said Mr. Lu Yong, "is extremely simple". Sing Tao has arranged with the Overseas Telecommunications Commission (OTC), for lease of a voice grade circuit from Sydney to Hong Kong. The circuit is, in effect, a hot-line - no dialing or cueing is required.

The Sing Tao operator on duty in Sydney can speak to their counterpart in Hong Kong by just lifting the telephone handset. Once the duty officer has arranged reception of the incoming data, the operator then only needs to flick a switch on the base of the handset to automatically convert the voice-grade circuit to data. The satellite transfer of the Sing Tao daily newspaper, from Hong Kong to Sydney, can then commence.

* * *

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SATELLITE LOCATOR

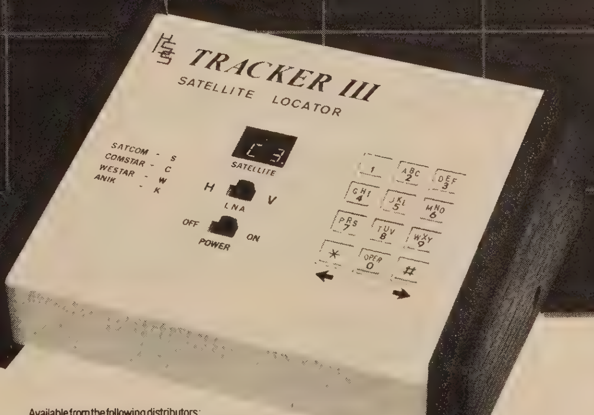
A TOUCH ABOVE THE REST

Why settle for just any satellite tracking system when the Tracker III could put the world at your fingertips.

State-of-the-art features and convenience. These are our biggest assets. From the comfort of your very own easy chair, you can set and reset your Tracker III System to zero in on any of the present or future satellites in the U.S. domestic belt with pinpoint accuracy. Our memory store enables you to pre-program your system for instantaneous repositioning at the touch of a button. The LED digital display shows you exactly which satellite you are positioned on, not just a meaningless position number. Also, Tracker III provides programable horizontal and vertical polarization for each satellite position, and will directly control Polarotor or Alliance rotatable feed system. This means that Tracker III will automatically compensate for "SKEW" and backwards Westar Satellites. Best of all, the Tracker III can be continually updated when more features become available, thereby eliminating any possibility of the unit ever becoming obsolete.

Adaptable to most dishes including ADM.

Tracker III now features Parental Lock-out.



HOUSTON SATELLITE SYSTEMS INC.

For more information on how to obtain your own Tracker III System, contact us today at

8000 Harwin, Suite 397
Houston, Texas 77036, 713-784-8953.

Available from the following distributors:

Capitol Electronics, Oklahoma City, OK (405) 721-7677
Delstar Systems, Houston, TX (713) 776-0542
Delta Satellite, Grafton, WI (414) 375-1000
Echosphere, Englewood, CO 1-800-521-9282
Echosphere, Sacramento, CA 1-800-338-5477
1-800-338-5478 in CA
High Frontier Dist, Phoenix, AZ 1-800-382-0395
High Frontier NW Dist, Seattle, WA (206) 575-0660
I.V.C., N. Little Rock, AR (501) 771-2800
Klan, S.A., Mexico (78-62-03)
Lindsay America, Williamsport, PA 1-800-233-2303
Lindsay, Ontario, Canada (705) 324-2196
National Satellite, Latham, NY 1-800-833-4485
Odom Antennas, Beebe, AR 1-800-643-2950
Pen's Electric, Baton Rouge, LA (504) 664-4106
Quarles Satellite, Greenwood, SC 1-800-845-6952
Sat-Com, Kellyville, OK (918) 247-6048
Satellite Relay, Cardiff, CA (619) 436-1555
Satellite Video Dist, McAllen, TX (512) 682-4501
Satellite Video Systems, Kansas City, MO (816) 333-0315
Star-Com, Big Spring, TX 1-800-351-1426
1-800-592-1476 in TX
Tele-Sat, Miami, FL 1-800-327-7272
Vicom-Norad, Orange, CA (714) 997-0630
West Inc, Mt. Vernon, WA (206) 428-2810
Wholesale Elect. Supply Sat, Austin, TX (512) 478-9568
Wright Technology, Hattiesburg, MS (601) 545-2545

TRACKER III is a trademark of Houston Satellite Systems, Inc.

You're looking at what experience can mean to a M/A-COM Home Satellite dealer.

At M/A-COM experience counts. Three decades of research, testing and development are inherent in the quality of our newest components. We offer a wide selection of reflectors, LNAs, LNBs, LNCs, receivers, polarizers and coaxial cable to complete your Home System.

Look to M/A-COM as your total home TVRO source. Our experience shows in the marketing expertise and in the nationwide distributor network that backs our dealers.

Each M/A-COM component is fully tested and fully warranted delivering studio-like reception. Tailor the system to your market. A full line of M/A-COM components includes LNAs, LNBs, LNCs, top-of-the-line receivers with a full range of options, a complete selection of high efficiency compression-molded fiberglass* antennas, a wide range of coaxial cable, and polarizers for solid state electronic switching.

We offer the components you can sell with confidence backed by the reputation of M/A-COM—the company at the forefront in satellite technology.

For quality products and a dealership second to none call your nearest M/A-COM distributor listed on the adjoining page. We can show you the wave of the future.

*Patent applied for

M/A-COM

Prodelin, Inc.
P.O. Box 100, Claremont NC 28610

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AV ELECTRONICS MARKETING
4301 North Star Blvd.
Great Falls, MT 59401
800-548-9950

BANVIL LTD.
775 Main St. E.
Milton, Ontario L9T3Z3
416-878-8181

C.A.L.E. COMMUNICATIONS
693 Henderson Dr.
Regina, Saskatchewan S4N6A8
306-527-0424

CONSUMER SATELLITE SYSTEMS
6202 La Pas Trail
Indianapolis, IN 46268
317-299-0020

ECHOSPHERE CORP.
2250 South Raritan
Englewood, CO 80110
303-935-1909

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Phoenix, AZ 85016
602-954-6008

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Granada, MS 38901
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ROSS ELECTRONICS
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Red Bluff, CA 96080
916-529-0200

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Green Bay, WI 54302
414-432-6851

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Cleveland, OH 44143
216-461-0000

SATELLITE TELEVISION SYSTEMS
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518-678-9306

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Sioux Falls, SD 57104
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503-389-0996

M/A-COM
Prodelin, Inc.
P.O. Box 100
Claremont NC 28610

Continued from page 30

News

R.L Drake Sues Channel Master. CINCINNATI, Ohio, August 10, 1983 -- Alleging copyright infringement and unfair or deceptive trade practices, the R.L. Drake Company of Miamisburg, Ohio today filed suit in United States District Court in Cincinnati against Channel Master Satellite Systems, Inc. and its parent company, Avnet, Inc., requesting a preliminary injunction which would prohibit Channel Master and Avnet from marketing a satellite television receiver which substantially duplicates one previously made by Drake for them.

Drake, which previously supplied a version of its ESR-24 receiver to Channel Master on a "private label" basis, is believed to be the largest manufacturer of satellite TV receivers for home use.

Among other things, Drake's suit alleges that a printed circuit board on which Drake claims copyright was directly copied in a similar unit now manufactured for Channel Master in Taiwan. The imported Channel Master receivers include a modulator which Drake believes does not have FCC certification. The imported receivers are also alleged to likely cause confusion and mislead the trade to believe that they are products made by Drake.

In seeking a preliminary and, ultimately, a permanent federal court injunction Drake has requested the court to prohibit Channel Master and Avnet from continuing to manufacture and sell satellite receiving components which substantially duplicate the appearance, internal construction and packaging of the receiver previously made by Drake as well as for the court to require them to deliver up for destruction all materials infringing Drake's copyright, including plates, molds, drawings and other materials used in manufacturing the imported receiver. The suit also seeks profits and unspecified damages.

Birdview Satellite Communications, Inc. (OTC), a designer and manufacturer of receive-only earth stations for the satellite television industry, reported sales of $4,911,171 with a net profit of $255,614 for the first quarter ended June 30, 1983, based on preliminary financial information. This compares with sales of $1,018,126 and a net loss of $864,343 for the same period last year.

Charles A. Ross, President of the Kansas based satellite communications company, said that Birdview now has a network of more than 500 dealers in 36 states to sell its earth stations to individual homeowners. Ross attributed the company's progress to a strong market demand and improved efficiencies in all areas of operation.

Private Cable Opportunities Teleconference, will be held Friday, October 7, 1983. Ten top experts on Private Cable have been gathered together so that you may evaluate, question and learn about the tremendous potential of owning your own private cable system. Leaders in the private cable industry have been especially chosen to sponser the event and provide the downlink in your city.

They will show you the equipment in operation and will even be able to answer any questions you may have via a coast-to-coast telephone link.

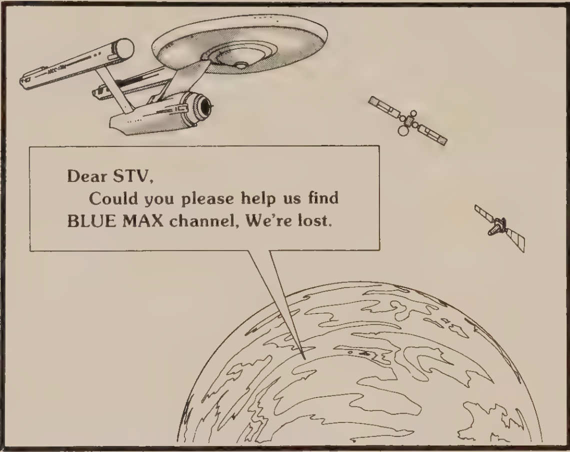
The panel of speakers for this teleconference includes such notables as Prof. Taylor Howard, Pat Weisner, Paul McKenney, Don Burns, Carl Feister, Terry Easton, Guy Davis, John Quarrier, Dr. Ed Meek and Dr. Dennis Tosh.

Some of the program highlights of this one day event will include an introduction to private cable with an overview of the satellite technology involved, legal aspects, equipment needed, financial considerations and marketing. The session will conclude with a panel discussion & summary.

This represents a unique example of the benefits of satellite technology thru teleconferencing and if you are interested in learning more about the private cable industry you should attend this conference.

For more information contact your local private cable affiliate for details and registration.

Continued on page 100


Dear STV,
Could you please help us find BLUE MAX channel, We're lost.

Uplink Downlink

LETTERS TO THE EDITOR

We get questions and sometimes provide the answers

Dear STV Magazine,

I am the proud new owner of an 8′ dish which has had me feeling like "Christmas in August".

I have a question which I hope you or some of your readers could answer. What time (M.D.T.) is the Carson Show fed to New York for editing and on what satellite? I have been searching but to no avail.

Please Help!

Sincerely Yours,
W.M Breckon
Hobbs, NM 88240

Sorry, Johnny Carson is both filmed and edited in L.A. and only the edited version is uplinked on the satellite. Originally the show was relayed to New York for editing but that was discontinued about two years ago.

Dear STV,

I would like a one year supply of your Satellite TV Magazine. Also I would like a copy of your Satellite Aiming Guide.

I am in the process of constructing my own dish; I wonder if you would be kind enough to give me some names of dealers who deal with the individual and not the company. I would like to deal directly with them, in order to obtain the electrical parts to construct my dish.

Thank you for your prompt atttention.

Arthur Ryan
Calgary, Alberta
Canada T2A 4S6

Take a look at the North American TVRO Dealer Listing in this magazine. They are usually several Canadian dealers listed who can supply components to the consumer. Good luck with your project.

Gentlemen:

Here is a followup on the Bill Barr aticle in your May issue.

I sent $5.00 to F & C Electronics for the PC board. Received my money back from them. Apparently Mr. Barr **did not send** the artwork for the PC board to them. And-- they have been unable to contact him.

As this circuit is so simple a custom PC board could probably be bypassed.

International Crystal circuits sent a bundle of papers but no direct answer as the exact unit required. As near as I can make out Catalogue # 035217 will do for the oscillator at $25.20 price, 9.5 to 15 volts DC required. (Dunno about postage)

Mini Circuits Laboratory at 2625 E. 14th Street, Brooklyn New York - 11235 sent the following:

SBL-1 1- 9 pieces 11.95

Add $3.75 for processing above order and shipping.

Please publish this. Should short circuit the time required for somebody attempting to duplicate Mr. Barr's work.

Sincerely,
Forrest Elliot
Oceanside TV Antenna SVC
Port Orford, Oregon
97465

Bill expresses his apologies and regrets that a lack of time is his only excuse. Thanks for the helpful tips.

Dear STV,

I enjoy your magazine very much. Please send me the name of a company that I could purchase satellite systems from. I want to form a company & lease our equipment to local hospitals motels and etc.

Thank You,
John Tedesco
Englewood Cliffs
New Jersey, 07632

The only advice I can offer to you is to drop a line to each of our advertisers. I obviously cannot recommend one company over another.

Dear STV,

I conclude from reading your magazine that you are pro-illegal descrambling devices.

In fact, I wonder if you are funding efforts to violate patents, etc.?

Theft of service is, after all, Theft. See attached article.

I called & left a message for you a couple of weeks ago without a response.

Incidentally, I think your comments on p. 43 of your Mar/Apr issue stating the "digital audio encoding was easy to defeat" is yellow journalism at its best.

Regards,
Dave Beeching
Oak Communications Inc.
Satellite Systems Division
Crystal Lake, Illinois 60014

I find that very often people tend to read articles and comprehend only what they wish to comprehend. My position on descramblers is simple - make descramblers and programming available to private terminal owners at a reasonable price - or face the consequences. Why should cable companies have a total monopoly when there is an alternative. Private terminal owners do not represent a threat to cable companies and represent only 1% of the total market and the majority of these systems are out of reach of cable systems.

I would also dispute your claim of "theft of service" and I invite you to point out one - ***just one*** *case where a private individual has been prosecuted in a U.S. court for theft of service using a TVRO for personal use.*

The article which you sent me refers to Canadian Bars and Taverns which use the signals for commercial gain - Hardly the same scenario as a private individual. Besides which - who in their right mind would hold up the CRTC, CBC or the Canadian Football League as shining examples of intelligent policing making bodies.

You have misquoted my comment in Mar/Apr STV Mag (page 43) - the sentence actually *reads "The sync suppressed, inverted video with digital audio encoding was* **apparently reasonably** *easy to defeat." The two missing words do tend to modify the tone of the meaning and you and I obviously have a different understanding of the term "yellow journalism". If a guy working in his basement can develop a device for a cost of about $150.00 which descrambles the Oak Orion System - I can only assume that it was "apparently relatively easy to defeat".*

We are apparently both very busy as I have returned your calls (ask your secretary) and left messages. Speaking of lack of response - I also left a message for Mr. O.J. Hanna in your Chicago office and he didn't call back either.

Uplink-Downlink is devoted to letters from our readers. We welcome questions, criticisms, comments or anything else you may feel is relevant. Unfortunately, we cannot publish every letter. However if you enclose a self-addressed stamped envelope, we will send you an answer if it is not published here. Please mark on the outside of any letter "Uplink/Downlink".

If you have noticed, this column has a small cartoon beside the title with a different caption each month. We welcome suggestions for this caption from our readers and if we pick the one you send in, we will send you $10.00.

Address your letters to:

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Uplink/Downlink
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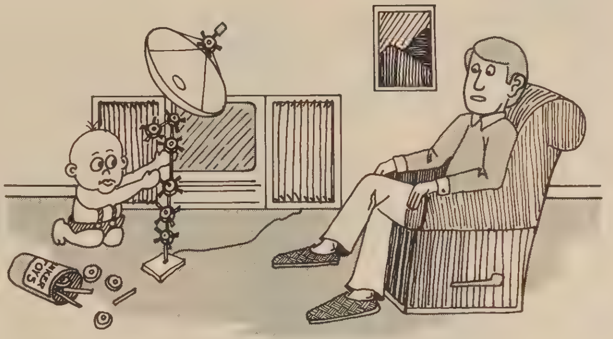
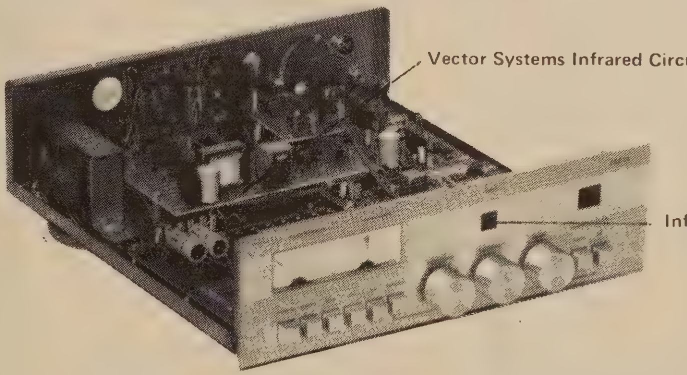
Shelby, NC 28150



"THOSE TINKER-TOYS ARE REALLY GETTIN' FANCY THESE DAYS!"

COTHRAN

Infrared Conversion For Drake* ESR 24



Vector Systems Infrared Circuit Board

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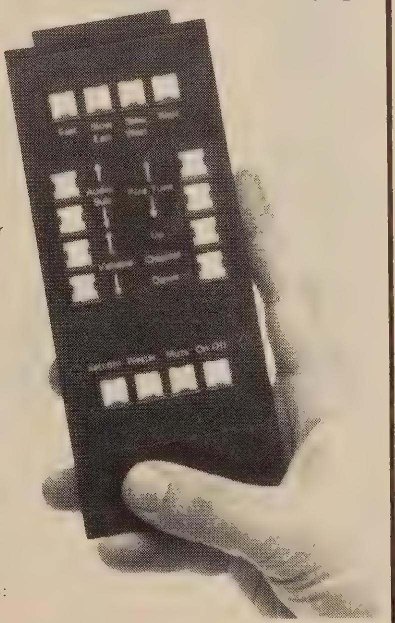

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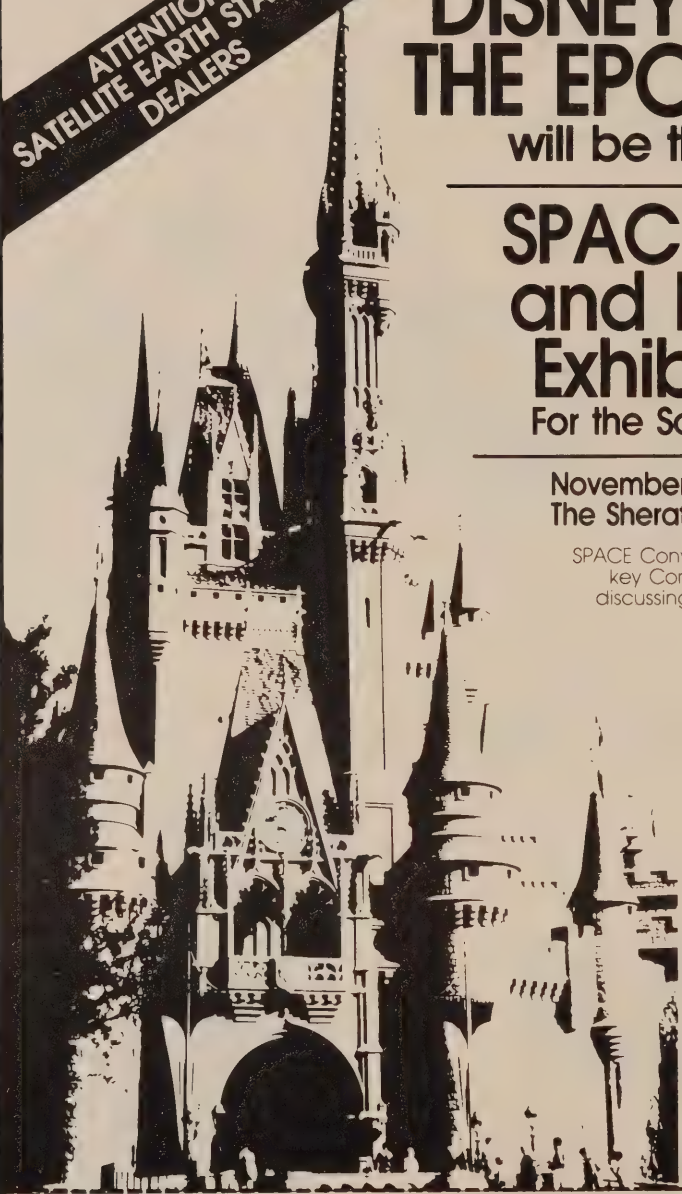

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News

Continued from page 95

Data recently released by the FCC indicates that video transmissions are increasing on the available transponders of the C-band Domsats, but there is still plenty of space available. Here is a break-down of transponder activity as reported by the FCC Field Operations Bureau. This data is based on observations made during daytime hours from June 21 thru 29.

	Inactive TR		Active TR	
Satellite	**Now**	**Previous**	**Now**	**Previous**
*Satcom 1R	8	13	3	1
Satcom 2	15	13	3	2
Satcom 3R	0	0	24	24
Satcom 4	15	16	9	8
Satcom 5	15	18	0	0
(* previous report monitored Satcom 1 which has been replaced by 1R.)				
Comstar 1/2	13	17	3	0
Comstar 3	6	6	5	5
Comstar 4	11	10	4	0
Westar 2	5	4	0	1
Westar 3	2	1	2	3
Westar 4	10	11	9	8
Westar 5	7	9	13	11

This shows an increase of 9 TV/FM transponders over last quarter. However there are still approximately 40% of the available transponders not in use at this time.

Turner sues NBC. Turner Broadcasting Systems, Inc., and the Atlanta Braves Major League Baseball Club has filed suit in Atlanta against NBC asking for declaratory and injunctive relief to enforce their right to televise, or assign their right to televise, the 1983 National League Championship Series in the Atlanta area. The Braves Club, which is wholly owned by TBS, has the best record in baseball and appears headed for the playoffs and possibly the World Series. NBC has the contractual rights to televise the league's playoffs but TBS claimed a team's flagship station (which is WTBS for the Braves) has the right to televise pre-World Series championship playoffs in its local market.

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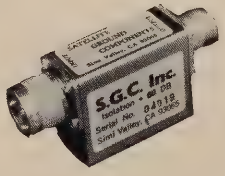

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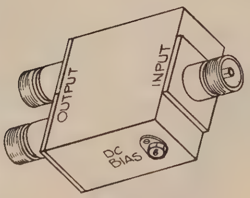

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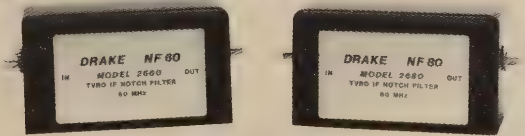
TVRO Terrestrial Interference NOTCH FILTERS



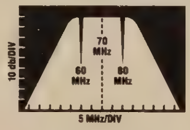
For 70 MHz IF

The Drake models NF60 and NF80 are designed to trap out transcontinental telephone microwave transmissions, which create carriers ± 10 MHz from the center of a satellite transponder channel, falling in the 3.7-4.2 GHz earth station band. These notch filters connect in series with the 70 MHz IF cable of any TVRO receiver. They may be installed singularly or together depending on requirements. DC continuity is preserved for receivers requiring tuning voltage through the IF cable to the down-converter.

SPECIFICATIONS

Model Number	Model	Description
2660	NF60	60 MHz notch filter/70 MHz IF
2680	NF80	80 MHz notch filter/70 MHz IF

Notch depth: 45 db MIN
3 db bandwidth: ± 1.5 MHz of center frequency.
Impedance: 75 ohms IN/OUT
Size 4.2″×2.25″×2.4″
Weight: 12 ounces



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Oscar 10 is up - but not exactly where it was intended to be. After the kick motor failed to place Oscar 10 into parking orbit, sources indicated the satellite was bumped from behind by the 3rd stage of the Ariane launch vehicle. The bird is now in what has been termed a "minimally useful" orbit.

The satellite's attitude on separation from Ariane's third stage was initially correct, but "very probably the 3rd stage caught up with the satellite after separation." The most likely reason for this seems to be higher than expected residual thrust from venting liquid oxygen. Engineers speculated that the vents were left open long enough to give the 3rd stage enough extra boost to hit Oscar's kick motor.

Vern Riportella, Exec. V.P. of U.S. Amsat, said that there was no proof that jarring in orbit caused the malfunction of the kick motor, but that's the most likely cause. After separation, the 3rd stage apparently bumped the satellite causing Oscar to start tumbling - delaying first firing of apogee kick motor for 3 weeks while engineers fought to control the bird.

Finally the satellite was stabilized and the first attempt to fire the kick motor was made unsuccessfully. Oscar will have to stay where it is, in orbit with an apogee of 35,000 km and a perigee of 3900 km with a 26 degree inclination to the equator. The planned orbit would have given Oscar a perigee of 1500 km and an apogee of 36,000 km with a 57 degree inclination. The higher planned orbit would have made Oscar hang longer over northern hemisphere where the majority of radio amateurs live. Riportella said, "The orbit's absolutely terrible and we've been grievously damaged. We've had a serious case of whiplash."

"Domsat" system to go into operation on Westar 4. The Democrats will be using satellite technology soon to transmit interviews with Congressmen to local TV stations. Interviews won't be transmitted live however. The TV station will call the Congressman and interview him by phone, then the videotape of the Congressman's answers will be transmitted to the TV station. Representatives and Senators will pay for the transmissions out of their tax-financed office accounts.

Hughe's Galaxy One, is up and running. However, one problem has already cropped up. One of the 4 receivers on the bird is currently suffering a severe drop in power. This is a spare receiver, and it leaves one or more spares to cover the two main receivers. A Hughes spokeswoman said that the company was "trying to isolate the problem but we're not currently optimistic about regaining operation of the receiver." She called the malfunction "unusual" but not serious because, "The other 3 receivers have been working fine and this loss will have absolutely no effect on operation of the satellite. We would have to lose an additional 2 [receivers] to have any impact."

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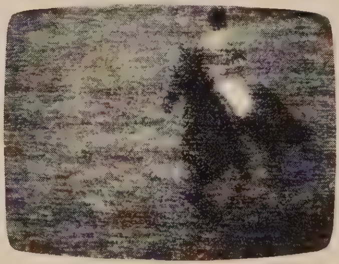
Harris Corp. Comsat has awarded Harris Corp. a $100 million contract to provide earth stations and maintenance for NBC's new Ku-band satellite network. Harris will be responsible for the installation of 23 satellite receiving stations at NBC affiliates, 2 transmit/receive stations and one master station to be located in NYC. As the network expands Harris will supply equipment for around 180 receive only and transmit/receive earth stations. System should be fully operational by 1985.

Continued

TERRESTRIAL
INTERFERENCE.



ASTI is the first complete professional handbook on the avoidance, diagnosis and suppression of microwave *terrestrial interference* (TI) at TVRO earth stations. This 250 page comprehensive volume was compiled by an engineering team headed by Glyn Bostick, President of Microwave Filter Company, with valuable input from many industry leaders such as California Amplifier and Scientific Atlanta. The result of their effort is an in-depth exploration of such topics as equipment selection for minimizing TI susceptibility, use of natural and artificial shielding, system filtering, and many other cost effective techniques! Send this coupon now to receive our free brochure on ASTI, and get TI out of the picture!

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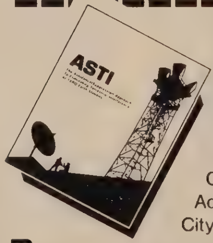

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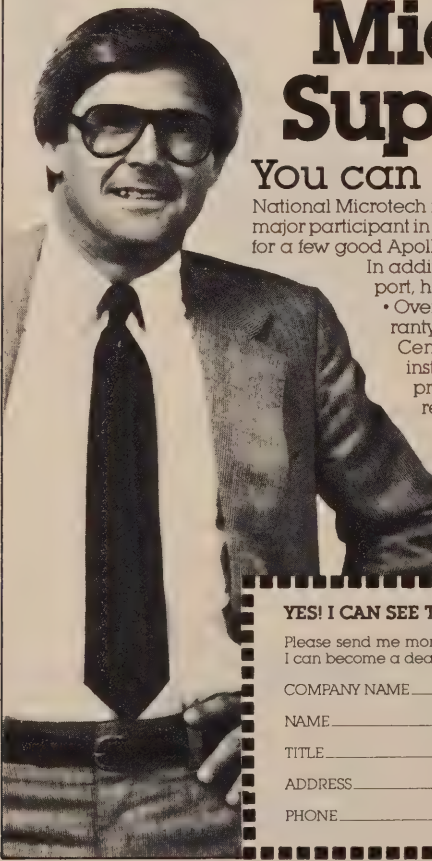
News

AT&T returns to space. The company which launched the U.S.'s first active communications satellite finally has a commercial bird of its own. Launched from Cape Canaveral July 28, Telstar 3-A is the first of 3 being built to replace the aging Comstar series. The other 2 will be launched in August 1984 and May 1985 pending FCC approval. Each bird has 30 transponders, 24 regular and 6 spares.

Besides being a big first for AT&T (owning instead of leasing), the Telstar is a big first for Hughes Aircraft, the company which built the AT&T satellite. This is the first bird for Hughes to use solid state power amplifiers in addition to the standard traveling wave tube amplifiers. The big advantage of the solid state amplifiers over tubes is greater reliability and longer life. The life expectancy of the Telstar is 10 years rather than the usual 7-8 years. Telstar carries 18 solid state power amplifiers and 12 TWTAs. The solid state amplifiers were designed by Bell Labs. After testing at 66°W, Telstar will be drifted to its operational slot at 96° W.

GTE Spacenet. First Spacenet satellite is expected to enter service in Spring of 1984. GTE is beginning construction of its' earth station complex at San Ramon, California. When completed, the center will have three 13 meter and two 9.2 meter antennas.

Continued



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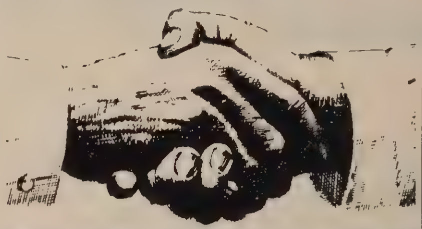

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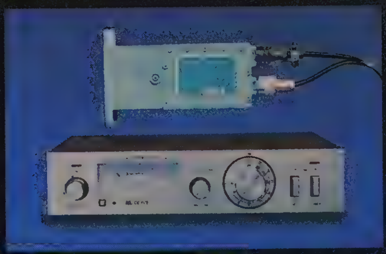

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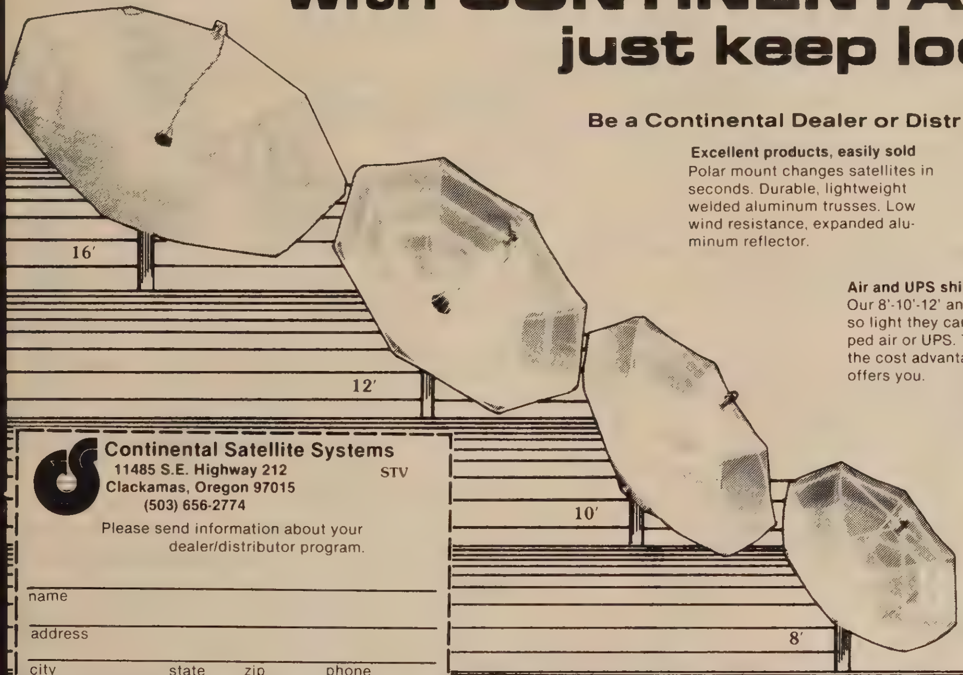

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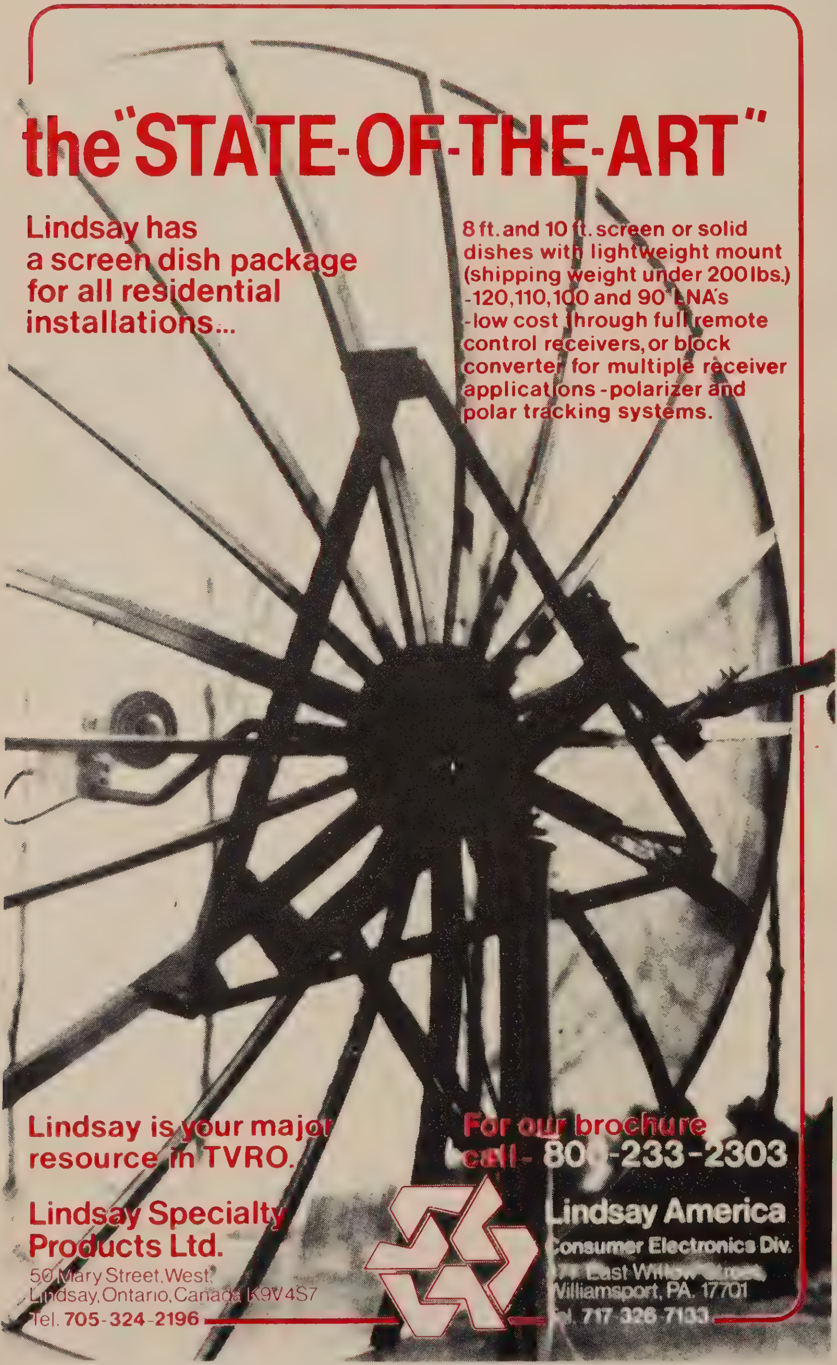
Cuba. Cuba has filed an advance notice of intentions to launch and operate a communications satellite with the International Telecommunications Union. The Cuban satellite would be designated STSC-1 and would provide 6/4 GHZ national and regional international telecommunications service over an area including all of the Caribbean basin as well as North and Central America. The satellite is scheduled to be launched in March of 1988 according to the application. Cuba said it expects to use an orbital slot at 83°W for the satellite.



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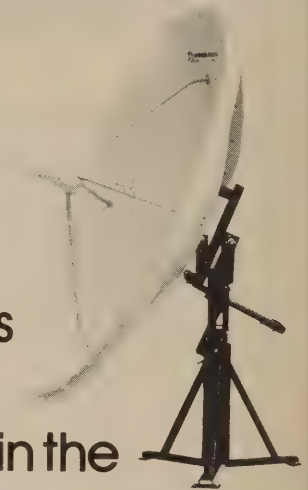

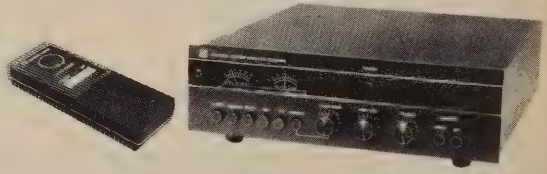

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Continued from page 10

Is it any wonder that Dr. Taylor Howard said, "It is the worst single thing I have ever read"? We are in complete agreement. "Channel Guide" had more than ample opportunity to make a more accurate transcription of the recording supplied to them by Conference Cassettes.

The Colorado newspaper omitted altogether the more subtle points of his oratory such as "Caveat Emptor". Wise advise ignored. Latin cannot be included in the Rocky Mountain High curriculum. My own advise is "Recte Factum" Denver (Do it right!).

The main problem is a lack of both practical and theoretical knowledge. In a recent telephone conversation with one of their staff members, he told me they only had one TVRO system between them all. Even expert Tay Howard said at CAN/AM recently how he used a TVRO system weekly, just to keep his hand in.

Sir Winston Churchill was a brilliant orator and Dr. Howard exhibits some of that brilliance. If ever Sir Winston wanted to reduce a situation to true size, he would either make an intential error in description or pronunciation. In just the same way Tay Howard spoke of "Boulder or Denver". Outstanding Sir!

He summons in me all the feelings demonstrated by Hart for his Law Professor, now on SHOWTIME, SATCOM 3, monthly. That brings us right back to programming once again.

Nashville sounds just great for the next STTI Show. Do come and see us, for the "Wolfpack" will be there in force - you all!

★ ★ ★

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HOT LINE BULLETIN

There is an unconfirmed rumor that G.E. may be negotiating to buy Harris Corporation. As of presstime - spokespersons for both companies could not be reached for comment.

ABC - TV's plans to change network distribution from terrestrial relays to satellite have fallen through. The high cost of the change-over has forestalled the plan according to an ABC spokesperson.

As of presstime only two video transponders were active on the newly launched Galaxy I. TR-6 & TR-20 are both Spanish speaking networks.

Oscar 10, the amateur radio satellite launched by the French Ariane launch vehicle settled into an unusual orbit when the "bird" was bumped by the third stage of the Ariane L6 rocket. The orbit has an elliptical path ranging form 3,951 to 35,505 km. Oscar 10 was operational as of press time and reports were very favorable.

A new programming guide entitled "Satellite Dish Magazine" will be introduced at the SPACE Show in Orlando. The bi-weekly publication will contain programming for all scheduled services plus regular reviews and previews of movies and special events. The full color slick magazine will be published in Grenada, Mississippi.

North American TVRO Dealer Listing

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Janeil, Complete TVRO Supplies

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News

Japan. The Japanese have launched two communications satellites, the first in orbit to use 30/20 GHz. The first was launched in March and the second Aug. 6, from Japan's National Space Development Agency's launch center at Tanegashima. The major subcontractor for the satellites is Ford Aerospace & Communications Corp. The two satellites have 6 Ku-band and 2 C-band transponders. The satellites are designated CS-2A and CS-2 and are located at 130° East and 136° East respectively.

Anik D. All three major networks and PBS will be heading north via Anik D starting Sept. 1. This move should help Cancom which was losing some $500,000 in Canadian funds per month earlier this year. Cancom believes the addition of CBS, ABC, NBC and PBS will add greatly to the attraction of its existing feed of 4 Canadian signals. Cancom expects to add an additional 1.2 million subscribers to its list of 200,000 current subscribers by offering these new services. The transmissions will be Oak Orion encrypted and downlinked to about 1,000 earth stations, mostly small cable systems and LPTV stations.

The Canadian Radio - TV & Communications Commission has approved Cancom's use of the U.S. signals despite some objections from Americom networks.

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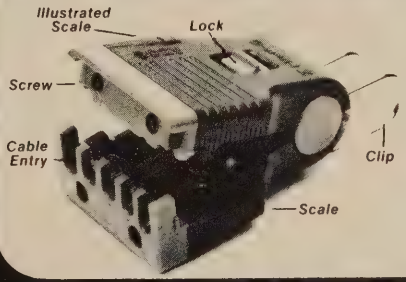

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CORRECTION

On page 56 in the September issue of STV Magazine, Chaparral Communications inadvertently made a mistake in their advertisement. Chaparral stated that their deep dish ring increased the "carrier to noise ratio by .9 dB which is the equivalent of replacing a 120° LNA with one that's 85°". It should have read "That's the equivalent of replacing a 120° LNA with one that's 100°". Chaparral Communications asked us to print this correction and we applaud them for their honesty.

ADVERTISERS' INDEX (In Alphabetical Order)

Amplica	14-15
Anderson Scientific	11
Andrews Electronics	104
Arunta	31
Avcom	71
Beddingfield & Co.	19
BR Satellite	2-3
California Amplifier	27
Channel Master	108
Chaparral	1, 56
Conifer	4
Continental Satellites	107
CZ Labs	113
DBS Satellite Television	26
Delta Satellite	103
Dexcel	106
Drake	16, 101
Earth Terminals	Rear Cover
Echosphere	20
EST Systems	18
Hastings Antenna	38
Hi Frontier	77
Hoosier	Inside Rear
Houston Satellite Systems	93
ICM Video	30
Industries PPD, Inc.	67
IVC	81
Janeil	54-55
Jensen	9
Kent	76
KLM	42
Lewis Electronics	102
Lindsay America	108
Longs Electronics	Inside Front
Lowrance	118
M/A-Com Omni	115
M/A-Com Prodelin	94-95
Microwave Entertainment	109
Microwave Filter	102
MTI Systems	28
National Micro-Dynamics	75
Natropolis Industries	113
Odom Antennas	112
Orion	29
PDQ Satellite Products	47
Radio Semiconductor, Inc.	80
Satellite Aiming Guide	112
Satellite America	117
Satellite Associates Limited	114
Satellite Earth Stations	100
Satellite Ground Components	100
Satellite Reception Sys., Inc.	107
Satronics	111
SPACE	98
STS, Inc.	39, 57-62
Satellite Video Services	116
Stellarview	101
TDF	63
Telsat	85
Tennasat	99
Transtar Comm. Corp.	12
Triton, Mfg.	25 & 69
Tulsat	43
TVRO Dealer Listing	110-111
Vector Systems	97
Vidare	6
Video Signals	85
Wespercom	7
Westar Communications	21
Wilson Microwave	105

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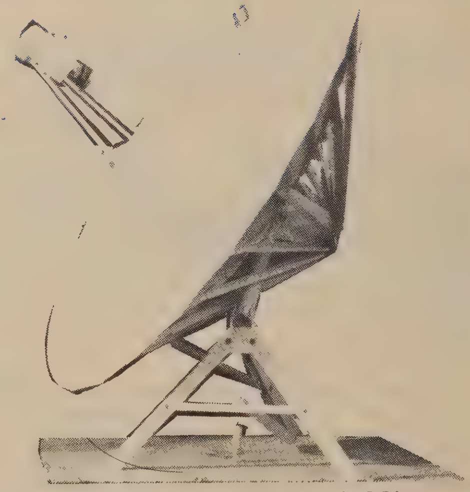

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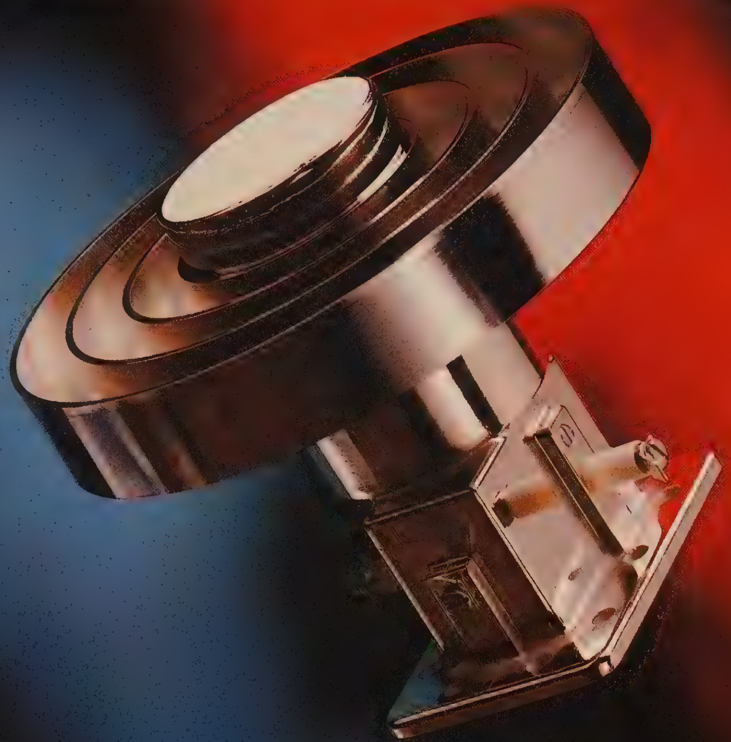

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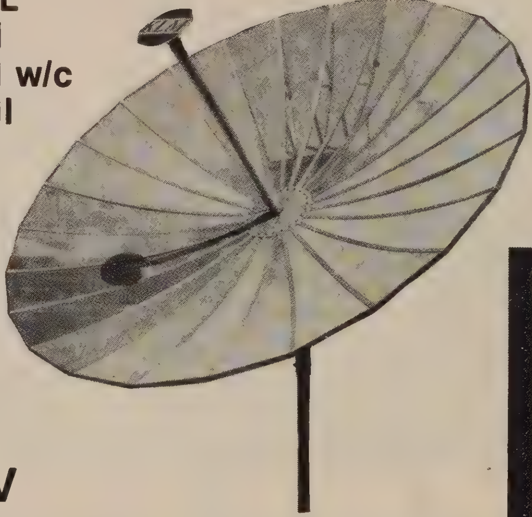

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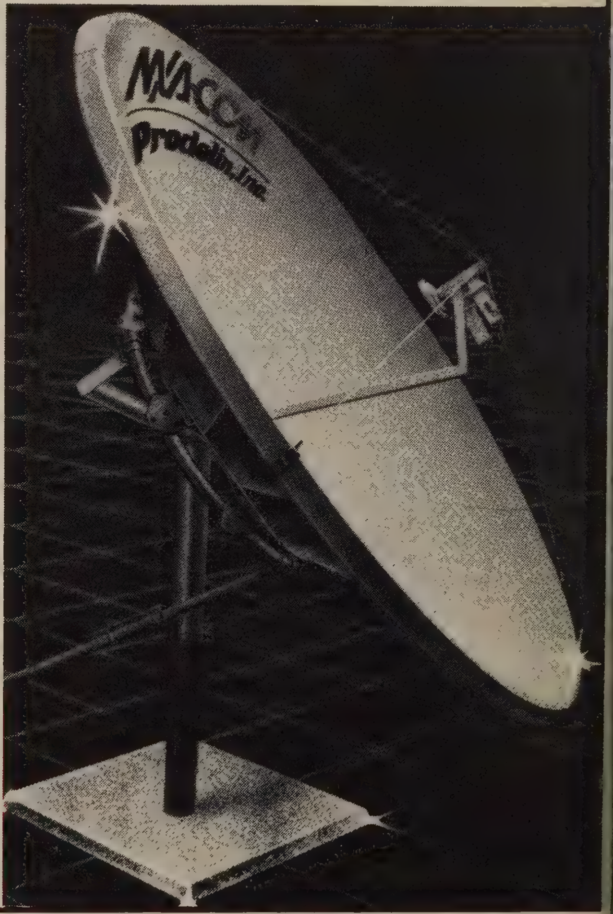
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Dave Fedric—President, Satellite America (Satellite Digest 1981 Man of the Year)

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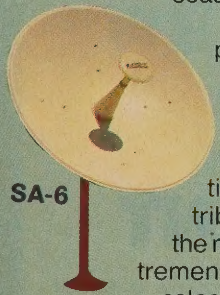
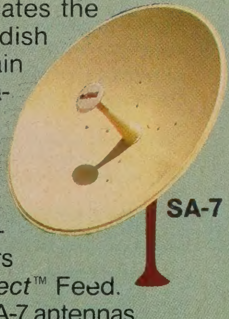
Satellite America leads a new revolution in small dish antenna development. This major advancement has dramatically expanded our market by substantially reducing retail prices of quality satellite systems. Satellite America technology now makes it possible for small six- and seven-foot antennas to deliver quality video coast to coast.



SA-6

Because these pioneering developments by Satellite America have reduced equipment and installation costs, our distributors throughout the nation are enjoying tremendous increases in sales and profits.

Our SA-6, SA-7 and SA-10 antennas incorporate our new *DualReflect*™ feed which relocates the LNA *behind* the dish where heat and rain are no longer major factors in system performance. Although competitors may try to copy it, only Satellite America offers the true *DualReflect*™ Feed.



SA-7

Our SA-6 and SA-7 antennas are of one-piece fiberglass construction with a special reflective surface that maximizes efficiency. Our SA-10 antenna is formed of eight thermo-compressed fiberglass panels that are perfectly matched for broadcast quality reception. The mounts on our SA-6, SA-7 and SA-10 offer similar improvements, making them the finest engineered and fabricated steel mounts available anywhere. For example, our new *PowerRing*™ on the SA-7 and SA-10 mounts includes a declination adjustment for the most precise and stable polar mount movement on the market.

SA-10

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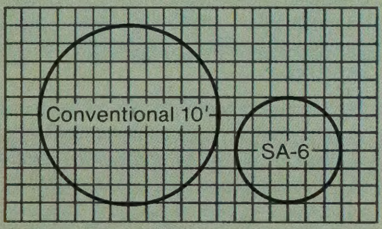
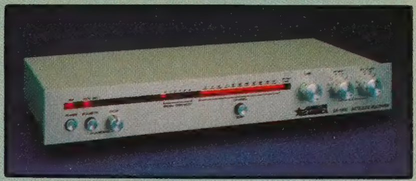


Our receiver technology is just as exciting. Our innovative new SA-1000 receiver is the first of a new generation of satellite receivers to come from Satellite America. LED tuning, push button controls, stereo and "high-tech" styling are the ingredients making this the industry's finest value.



But products alone do not define our company. Our total concept of integrated marketing, advertising and logistical support sets Satellite America apart. In a few months, Satellite America has become one of the largest satellite system suppliers in the world. We believe we supply more satellite systems than anyone else in the U.S.A. and we know ours look the best.

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Sincerely,

David M Fedric

Dave Fedric, President

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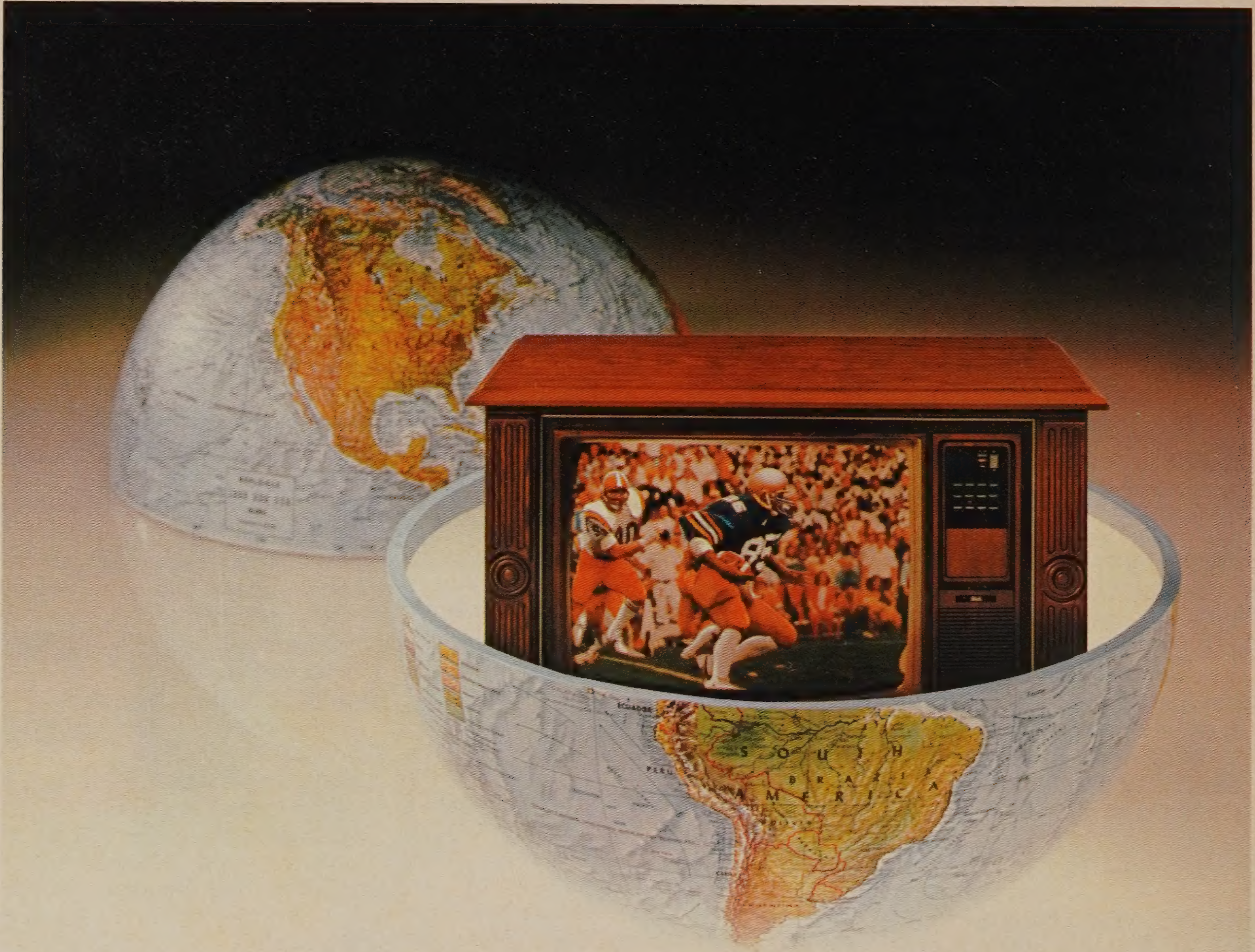

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Today, television and stereo programming is so diverse — so complete — it's no longer enough to have access to only a few channels.

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It all comes from a satellite earth station — consisting of a dish antenna, amplifier and satellite receiver. The station picks up signals from satellites thousands of miles overhead and converts them into television and stereo for you to enjoy. And it's surprisingly affordable. (Systems start as low as $2,000.)

The most advanced receiver on the market today is System 7, made by Lowrance Electronics. We supply the satellite receiver, and our distributors add a dish antenna. Lowrance has been a leader in the electronics industry for more than 25 years now. You may already be familiar with our sportfishing sonar products, acclaimed as the finest in the world. And we're building that same quality and reliability into our satellite receivers.

Right now, you're missing out on worlds of entertainment. For more information on the Lowrance Earth Station/System 7 Receiver, clip the coupon below and mail.

*While most satellite programming is free, some channels are reserved for pay audiences and may require a small fee in the future.

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Videophile Satellite Television

The possibilities of component audio come to satellite video.

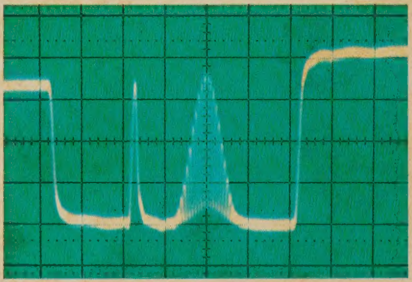
Component equipment has become popular in the audio field for a lot of reasons. One reason is that the component philosophy allows a purist to upgrade any piece of a system as technology advances without having to replace the entire system at once. This basic idea has ushered in an era of specialty firms dedicated to advancing the art of a single link in the chain. They succeed because all of their efforts are focused on one discipline, not thinly spread over an entire system. EARTH TERMINALS™ brings this philosophy to satellite television. We concentrate on the single most important, most difficult element—the microwave receiver. No other part of the system has such a dramatic effect on picture quality.

Quality You Can See

An EARTH TERMINALS receiver provides cleaner pictures with less granularity. Truer colors that don't smear. Less sparkling snow on weak programs. Complete absence of herringbones and waves. Superimposed lettering that doesn't tear at the edges. In fact, you haven't seen video this exciting unless you've been in a television studio. If you own a quality video projector, you'll be even more impressed.

Quality You Can Measure

Broadcast engineers are impressed with the accuracy of EARTH TERMINALS receivers too. Our VITS Sin² Pulse and video SNR test results are incomparable; actually the equal of most commercial grade receivers. We can also handle tough signals like Reuters data transmissions that give other receivers fits. It's no wonder then, that after exhaustive testing, some cable companies and television stations use EARTH TERMINALS receivers as their main source of satellite program material. They know value when they see it.



Unretouched Off-The-Air Sin² Pulse Test

It's Easy To Live With

All this technical sophistication is really quite easy to get along with. Precise automatic fine tuning tunes every channel the same way every time. You don't have to be an expert to get perfect pictures. EARTH TERMINALS receivers come with a remote control that selects channels individually, adjusts audio volume at your convenience, and automatically signals the rest of your system to supply the proper antenna polarization through an even/odd channel switch. And it fits in the palm of your hand.

Tips On Value

There are plenty of satellite receivers that cost less than ours, but nearly all of them need bigger antennas and more exotic Low Noise Amplifiers for a picture free of sparkling snow. If you're on a budget, you can save money in other parts of the system by paying more for our receiver and come out even. You get high fidelity video in the bargain. If you're simply after the best picture money can buy, we can make it very affordable. Either way, give us a call or write us for the details.

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513-489-6200

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